1998

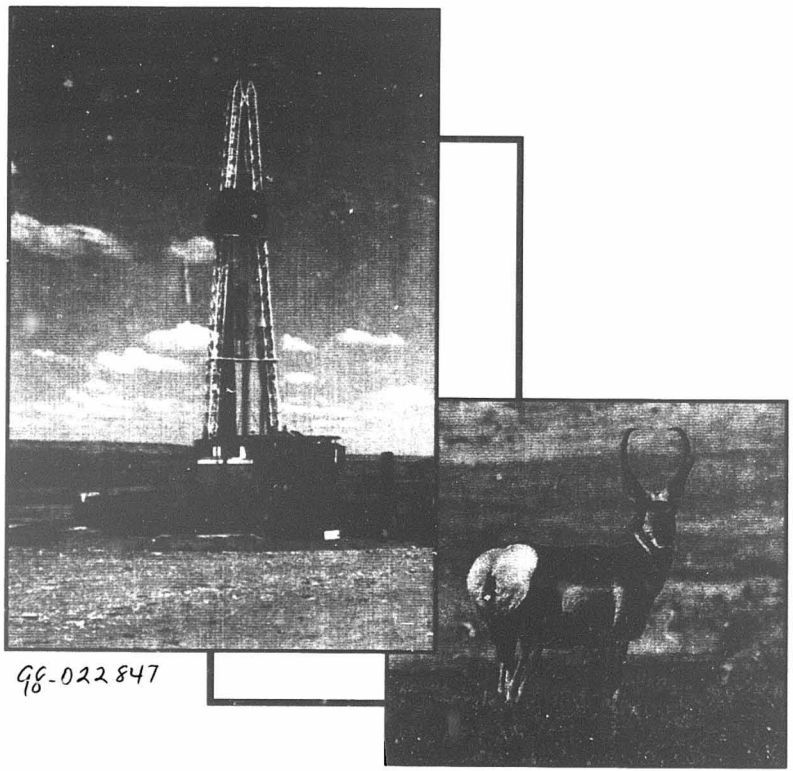
Record of Decision Jonah Field II Natural Gas Development Project Environmental Impact Statement

United States Department of the Interior, Bureau of Land Management

U.S. Department of the Interior
Bureau of Land Management
Rock Springs District Office

Pinedale and Green River Resource Areas April 1998

RECORD OF DECISION
Jonah Field II Natural Gas Development Project Environmental Impact Statement



The Bureau of Land Management is responsible for the balanced management of the public lands and resources and their various values so that they are considered in a combination that will best serve the needs of the American people. Management is based upon the principles of multiple use and sustained yield; a combination of uses that take into account the long term needs of future generations for renewable and nonrenewable resources. These resources include recreation, range, timber, minerals, watershed, fish and wildlife, wilderness and natural, scenic, scientific and cultural values.

BLM/WY/PL-98/015+1310

United States Department of the Interior

BUREAU OF LAND MANAGEMENT
Wyoming State Office
P.O. Box 1828
Cheyenne, Wyoming 82003-1828

In Reply Refer To:

1793 (930)
Jonah 2 ROD

27 APR 1998

Dear Reader:

This Record of Decision (ROD) for the *Jonah II Natural Gas Development Project* is provided for your information and use. The *Jonah II Natural Gas Development Project*, hereafter referred to as the Jonah II Project, is located in south central Sublette County, Wyoming. The ROD defines the decision and explains the rationale (including key management considerations) for the Jonah II Project. The BLM decision is subject to appeal as explained in the decision.

This ROD is the culmination of detailed analyses on the environmental effects of implementing the Jonah II Operators proposed developments or alternatives. On July 25, 1997, the Bureau of Land Management (BLM) released the Draft Environmental Impact Statement (EIS) and on February 27, 1998, the Final EIS for the Jonah II Project.

The Jonah II EIS was prepared pursuant to the National Environmental Policy Act and other regulations and statutes to fully disclose the potential environmental impacts which could result from implementation of the Jonah II Project and to solicit public comments and concerns. The EIS process is designed to inform the public of, and provide opportunity to comment on, an action proposed for implementation on public lands, including reasonable alternatives, and to disclose through detailed analysis, potential impacts associated with implementing the proposal or alternatives including reasonable opportunities to mitigate potential impacts.

A copy of the ROD has been sent to affected Government agencies and to those persons who responded to scoping, commented on the EIS, or otherwise indicated to BLM that they wished to receive a copy of the EIS/ROD. Copies of the ROD are available to the public at the following locations:

Bureau Of Land Management Wyoming State Office 5353 Yellowstone Rood Cheyenne, Wyoming 82009	Bureau of Land Management Rock Springs District Office 280 Highway 191 North Rock Springs, Wyoming 82901	Bureau of Land Management Pinedale Resource Area 431 East Mill Street Pinedale, Wyoming 82941

The BLM thanks all the individuals and organizations who provided suggestions and comments on the Draft and Final EIS. Your help has been invaluable in preparing the EIS and the attached ROD.

Sincerely,

Alan R. Pierson
State Director

Attachment

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MAP

TABLES

APPENDICES

ABBREVIATIONS AND ACRONYMS

ANC	Acid neutralization capacity
AO	Authorized Officer
APD	Application for Permit to Drill
AQRVs	Air Quality Related Values
BACT	Best Available Control Technology
bbl	barrel
BMPs	Best Management Practices
CAA	Clean Air Act
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act (1980)
CFR	Code of Federal Regulations
COAs	Conditions of Approval
DEIS	Draft Environmental Impact Statement
EAs	Environmental Assessment
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency, Region VIII
FEIS	Final Environmental Impact Statement
FLPMA	Federal Land Policy and Management Act
g/hp-hr	grams per horsepower hour
gal	gallon
HAPs	Hazardous Air Pollutants
hp	horse power
IBLA	Interior Board of Land Appeals
kg/ha-yr	kilogram per hectare per year
LOP	Life of project
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NO_x	oxides of nitrogen
NRHP	National Register of Historic Places
NSO	No Surface Occupancy
PRA	Pinedale Resource Area
PSD	Prevention of Significant Deterioration
RFD	Reasonable Foreseeable Development
RMP	Resource Management Plan
RMP EIS	Resource Management Plan Environmental Impact Statement
ROD	Record of Decision
ROWs	Rights-of-way
SARA	Superfund Amendments and Reauthorization Act (1986)
SIP	State Implementation Plan

SNs	Sundry Notices
SO_2	Sulfur Dioxide
SPCCP	Spill Prevention, Control, and Countermeasure Plan
SWPPP	Stormwater Pollution Prevention Plan
SWYTAF	Southwest Wyoming Technical Air Forum
T&E	Threatened and Endangered
TUPs	Temporary Use Permits
µeg/l	microequivalents per liter
USFWS	U.S. Fish and Wildlife Service
VOCs	Volatile organic compounds
WAAQS	Wyoming Ambient Air Quality Standards
WDEQ	Wyoming Department of Environmental Quality
WGFD	Wyoming Game and Fish Department
WOGCC	Wyoming Oil and Gas Conservation Commission

Record of Decision - Jonah Field II Natural Gas Development Project

RECORD OF DECISION
For
Expanded Jonah II Area
Natural Gas Development Project
Environmental Impact Statement

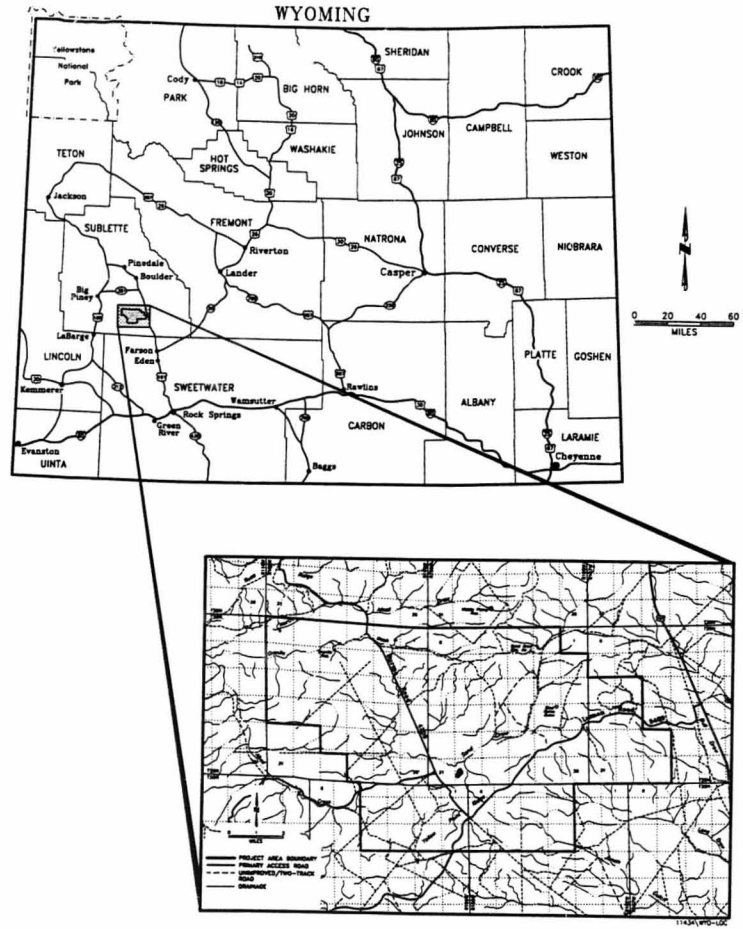
This document records the decision made by the Bureau of Land Management (BLM) for managing the public land surface and federal mineral estate in the *Jonah II Area Natural Gas Development Project* (hereafter referred to as the *Jonah II Project*). The Jonah II Project area comprises approximately 59,600 acres of Federal, State, and private land ownership. Of this total, approximately 56,400 acres are BLM administered or 95 percent; 2,560 acres are State of Wyoming or 4 percent; and 640 acres are private surface/federal minerals, or 1 percent. See Map 1.1 for the location of the Jonah II Project.

The Jonah II Project development is the proposal of McMurry Oil Co., Snyder Oil Corporation, Amoco Production Company (Amoco), Western Gas Resources, and other oil companies (hereafter referred to as the "Operators").

DECISION

The Bureau of Land Management (BLM) approves the Jonah II Operators *Proposed Action* for the development and production of natural gas on public lands. Approval of the Proposed Action provides for managing the Jonah II area, in accordance with the Federal Land Policy and Management Act (FLPMA) (Sec. 202(e)), in a manner that allows for natural gas development while continuing to provide for the existing principal and major uses recognized by the land use plan for this area (i.e., domestic livestock grazing, fish and wildlife development and utilization, mineral exploration and production, rights-of-way, and outdoor recreation). The Proposed Action balances the multiple uses and sustains the long-term yield of resources, while promoting stability of local and regional economies, environmental integrity, and conservation of resources for future generations.

The decision approving the Proposed Action recognizes the area of the Jonah II Project as one which has been under development for natural gas since 1993, has significant reserves and will continue to be developed for its natural gas resource. The decision recognizes that there are other important natural resources and values within the area which require consideration and protection from unnecessary or undue degradation. The decision incorporates restrictions and mitigative measures in consideration of Federal, State, and local agency, public, and affected Indian tribes concerns raised during scoping and in comments received on the draft EIS. Common concerns raised were potential cumulative impacts as they pertained to changes in land use, air quality, wildlife and wildlife habitat, and socio/economic impacts. The BLM decision provides maximum consideration for the protection of the identified concerns through planning associated with and inherent in each authorization for the implementation, operation, and abandonment of activities to develop the mineral resource. In addition, the decision ensures the protection of livestock grazing, travel, watersheds, cultural and paleontological resources, and other land and resource uses in the Jonah II Project area.



Map 1.1 General Location of the Jonah Field II Project Area, Sublette County, Wyoming, 1997.

Approval of the Proposed Action and the individual project components associated with the Proposed Action are subject to the administrative requirements and conditions of approval listed below as well as the *applicant-committed practices and the environmental standards, procedures, and requirements specified in Appendices A (Transportation Plan), B (Reclamation Plan), C (Environmental Standards, Procedures, and Requirements for Implementation of the Expanded Jonah II Field), and D (Wildlife Monitoring/Protection Plan)* of this Record of Decision (ROD). This ROD authorizes the BLM, Pinedale Resource Area Manager to process Applications for Permit to Drill (APDs), Sundry Notices (SNs), Rights-of-Way (ROWs), and Temporary Use Permits (TUPs) on public lands administered by the BLM for the Jonah II Project Operators and for companies contracted by the Jonah II Operators. Approval of individual applications authorize the implementation of the various components of the Jonah II Project (e.g., access road and well pad construction, gas gathering pipeline and production facilities installation, etc.).

Based on current understanding of the natural gas reservoir characteristics (i.e., geology, flow data from existing producers, expected recovery factors, and economics), it is reasonably expected by the Jonah II Operators that the area will be developed at a spacing of eight wells per section (80-acre well spacing). If the spacing needs to be less than 80 acres, then additional environmental analysis will be required.

Approved Project Components

This ROD provides the BLM Pinedale Resource Area Manager approval to permit the following project components on BLM-administered public lands (95 percent of the land ownership) within the Jonah II Project area (see Map 1.1):

450 natural gas well locations,
4 compressor units with a combined total of 12,000 horsepower,
180 miles of access road,
180 miles of gathering pipeline,
22 miles of sales pipeline,
10 water wells.

Development beyond the specified levels will require the preparation of a new environmental analysis.

- **Wells**

The construction of up to 450 additional natural gas well locations, in addition to proposals approved in the Jonah EA (BLM 1994), on BLM-administered lands as proposed for the Jonah II Project area. The Jonah II Operators will drill wells on not less than 80-acre spacing over the next ten to fifteen years. In addition, ten or more water wells may be developed and operated during the life of this project. More than 10 water wells may be drilled on approved gas well locations but the total draw down (volume analyzed) will remain the same.

- **Compressors**

The construction and installation of up to 4 compressor locations with a combined total of 12,000 hp on BLM-administered lands.

- **Other Facilities**

Construction and installation of tanks, separators, dehydration units, and other equipment at individual well sites on BLM-administered lands needed to produce the wells for the life of the well.

- **Access Roads and Gathering Pipelines**

The construction and/or upgrade of up to 180 miles of access road and 3- to 4-inch diameter natural gas gathering pipeline on BLM-administered lands. Gathering pipelines will be routed in a manner that best utilizes the existing topography in order to minimize surface disturbance including surface and buried pipelines, and pipeline placement parallel to existing roads. Twenty-two miles of sales pipeline outside of the Jonah II Project Area may be authorized as well. Improvement of seventeen miles of the Burma and Luman Roads is also authorized.

Administrative Requirements and Conditions of Approval

Implementation of the Jonah II Project is subject to the following requirements and conditions.

- **Authorizing Actions**

The Jonah II Operators are responsible for obtaining all necessary federal, state, and county permits, and for developing the Jonah II natural gas infill drilling project in an environmentally responsible manner (See Table 1-1, Federal, State, and Local Permits, Approvals and Authorizing Actions Necessary to Implement the Expanded Jonah II Area Natural Gas Development Project in the DEIS).

- **Site Specific Environmental Analysis**

Before authorization of individual actions on public lands (e.g., APD, SN, ROW, TUP), the final location for each well site, access road, gathering pipeline segment, or other facility will be determined following a site specific environmental document in accordance with the BLM National Environmental Policy Act Handbook (H-1790-1).

- **Plans/Reports**

Authorization of multiple or individual actions (e.g., road construction, well pad construction and drilling, pipeline construction, production facility installation) will require the responsible Operator(s) to submit various plans/reports, to the BLM Pinedale Resource Area Manager, covering planned multiple field operations or covering an individual application (e.g., APD, SN, ROW, TUP). These plans/reports will serve as the Operator's field operations guide. The plans/reports are as follows:

Transportation Plan and Updates (Appendix A); Cultural Clearance Reports (Class I and III); and an annual report containing an inventory of project features, proposed development for the next 12 months, and wildlife inventory, monitoring, and protection data collected during the year.

- **Road Development Plan-Transportation Plan**

A transportation plan has been prepared for the Jonah II Project Area (Appendix A). The Plan describes the procedures by which transportation planning, road design, construction, and road maintenance will be conducted by the Jonah II Operators to meet their operational needs and BLM requirements for road standards, safety, and resource protection. Guidance on the content and processes for Transportation Planning are being developed in accordance with the Green

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River Basin Advisory Committee recommendation.

Transportation planning for the Jonah II Project area will incorporate the annual review of well development plans between the operator and BLM. The review will entail assessment of existing roads and how the planned incremental well development roads tie in with the existing network to ensure safety and protection of natural resource values. As individual APDs, SNs, ROWs, and/or TUPs are prepared for submission to BLM following on-site inspection, site-specific considerations relative to safety and environmental protection will be given to access road location, design, construction, and maintenance in accordance with the guidance of the Transportation Plan for the Jonah II Area.

- **Air Quality**

All air pollutant emissions from future federally authorized development, including the Jonah II, Fontenelle, Moxa Arch, Stagecoach Draw, and Jonah developments, shall comply with all applicable local, state, and Federal air quality laws, statutes, regulations, and implementation plans. The air quality analysis produced for the Jonah II Field Development EIS updates the RMP air quality evaluation on a cumulative basis for the region.

Emissions Control - Air pollutant emissions from operation of the Jonah II development project were based upon the analysis assumptions contained in the *Jonah II EIS - Revised Air Quality Technical Support Document (Cumulative Impact Analysis of Southwestern Wyoming Natural Gas Development Projects on Air Quality, (February, 1998))*, in addition to the Wyoming Department of Environmental Quality's *Oil and Gas Industry Section 21 Permitting Guidance Document (June, 1997)*. If activity and corresponding emission assumptions and impacts exceed those used for the analysis, the BLM, in cooperation and consultation with Wyoming Department of Environmental Quality (WDEQ), Environmental Protection Agency Region VIII (EPA), USDA-Forest Service and other affected agencies, will undertake additional cumulative air quality environmental review as required by Council on Environmental Quality (CEQ) regulation 40 CFR 1502.9(c)(1)(ii).

Each compressor engine undergoes Best Available Control Technology (BACT) review by WDEQ. The appropriate controls will be determined as part of the air quality preconstruction evaluation and permitting process required by the WDEQ.

Visibility Impact Mitigation - The Moxa Arch-Fontenelle EISs Air Quality Technical Support Document and USDA-Forest Service information provided in response to the Moxa Arch Final Environmental Impact Statement (FEIS) identified a level of visibility cumulative impact concern for oxides of nitrogen (NO_x) emissions with an increase of 977 tons per year above levels existing at the time of the analysis (January 1, 1996). Additional NO_x emissions at or above 977 tons per year could result in impacts exceeding USDA-Forest Service Limits of Acceptable Change for visibility within the Bridger Wilderness area of the Bridger-Teton National Forest.

Operators will cooperate with BLM and WDEQ in determining when or if NO_x emission levels, from all activities within the BLM Rock Springs District (including the Jonah II, Moxa Arch, Fontenelle, Stagecoach Draw, and Jonah development areas), reach 977 tons per year above January 1, 1996 levels. (The 977 tons per year was generated by the USDA Forest Service at the request of the BLM Rock Springs Office to determine how much NO_x could be emitted from Moxa Arch and adjacent projects without exceeding the Forest Service 0.5 deciview limit of acceptable change for one day at the Bridger Wilderness.) If this level of emissions is reached, BLM will notify EPA, the USDA Forest Service, and the WDEQ that further emissions may have an adverse impact on air quality related values. Further, BLM, consistent with its letter of Agreement for Tracking Nitrogen Oxide Emissions with WDEQ dated June 20, 1997, and in cooperation and consultation with WDEQ, EPA, USDA-Forest Service, and other affected agencies, will continue to track air quality in the affected region, and will verify the level of emissions, determine visibility impacts through additional modeling, and determine whether unanticipated visibility impacts are predicted or occurring in order to produce additional documentation that may be required under the National Environmental Policy Act (NEPA). BLM will use this information in making recommendations to EPA regarding air quality and to WDEQ regarding permitting for existing leases, and in making decisions regarding future leases on BLM-administered lands.

If visibility impacts are determined to be greater than predicted at 977 tons of NO_x and/or if increased contributions of other pollutants (such as volatile organic compounds (VOCs)) result in higher emission levels than stated in the BLM's cumulative air quality impacts analysis, then BLM will conduct additional NEPA analysis and/or additional monitoring. The additional information will be used to make recommendations to WDEQ regarding permitting of further development under existing leases, as well as BLM decisions regarding future leases. To the extent authorized by the lease terms and federal or state law, operators may be required to cooperate in the implementation of a supplemental coordinated air quality monitoring program or emissions control program.

The following identified mitigating measures are being accepted by BLM in this decision:

- Roads and well pads that prove to be susceptible to wind erosion will be appropriately surfaced or have dust inhibitors applied to reduce fugitive dust.
- Operators will establish and enforce speed limits to reduce fugitive dust concerns as well as for human health and safety reasons.
- Jonah II Project Area emissions will be tracked as a subset of the current tracking agreement described above.

In addition, BLM offers to WDEQ the following, but not all inclusive, list of possible mitigation measures for their consideration in permitting facilities having NO_x emissions:

Total NO_x emissions should be kept below 158.6 tons per year from the Jonah II in order to achieve the USDA Forest Service's 0.5 deciview visibility Limit of Acceptable Change until new information becomes available, as discussed below, that indicates that this number should be changed. The analysis shows that the 0.5 deciview limit established by the USDA Forest Service would not be exceeded on more than one day at this level of emissions. When coupled with the previously identified 977 tons per year level of

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concern these two thresholds should prevent the USDA Forest Service 0.5 deciview Limit of Acceptable Change from being exceeded.

The control of NO_x emissions at or below 158.6 tons per year limit could be achieved in a number of ways including but not limited to:

- Establishing BACT as 1.0 g/hp-hr, or lower, for compressor engines.
- Denying additional permits once the threshold is reached.
- Using new technologies as they become available.

Operators can reduce the amount of emissions associated with compression by building larger diameter pipelines and adopting new emissions control technology as it becomes available.

The cumulative 977 tons per year above the January, 1976 levels and/or the Jonah II 158.6 tons per year NO_x emission levels of concern could change. Supporting technical analysis, concurred with by the BLM, WDEQ, EPA, USDA-Forest Service, and other affected agencies, could show that the level of concern should be lowered, raised, or eliminated. The supporting technical analysis may come from 1) the State of Wyoming Implementation Plan (SIP) approved by EPA; 2) the Southwest Wyoming Technical Air Forum (SWYTAF) following completion of their mandate to determine and concur in model(s) and model input assumptions that will be used to analyze air quality impacts; or 3) other information source.

Atmospheric Deposition Impact Mitigation - No additional air quality mitigation has been identified to further reduce potential atmospheric deposition in high mountain lakes with low acid neutralizing capacity (ANC).

Air Quality Mitigation Program - No additional air quality mitigation has been identified to further reduce potential air quality impacts. The WDEQ currently requires BACT review for all air pollutant emission permits. WDEQ requires that a site-specific BACT analysis be conducted by the proponent as part of its pre-construction permit application. This long standing requirement is a technology forcing regulation which will help mitigate potential cumulative NO_x emissions impacts.

Air Quality Monitoring/Tracking Program - At this time, no additional air quality monitoring measures have been identified as being needed to measure potential air quality impacts. As deemed necessary under Section 6 of the oil and gas lease terms, BLM may require the lessee, within the lease rights granted, to take measures deemed necessary for the conduct of operations in a manner that minimizes adverse impacts to the air resource, as well as other resources. The BLM will continue to cooperate with existing visibility and atmospheric deposition impact monitoring programs. The need for and the design of additional monitoring will include the involvement of SWYTAF. Based upon the SWYTAF's recommendations, operators may be required to cooperate in the implementation of a coordinated air quality monitoring program.

It is BLM's understanding that the USDA Forest Service will be installing and operating additional air quality monitoring sites between Pinedale and South Pass in the near future (personal communication with Dennis Hemmer, USFS on March 20, 1998).

The BLM, consistent with its Letter of Agreement for Tracking NO_x Emissions with WDEQ, will continue to track total NO_x emissions within the BLM Rock Springs

District. Tracking total NO_x emissions will require close coordination between the Federal land management and State environmental regulatory agencies regarding receipt of applications for NO_x emitting sources and maintenance of a NO_x emissions inventory. The procedure that will be followed by WDEQ and BLM in tracking NO_x emissions is defined in a written agreement, dated June 20, 1997, between the Director of the Wyoming DEQ and the BLM Rock Springs District Manager.

Tracking will include documentation of changes (increase and decreases) in NO_x emissions from *existing sources* (e.g., plugged/abandoned wells, retrofitting compressors, wells, power plants, etc., with BACT) and NO_x emissions from *new sources* due to permitting of activities. Where applicable, emission changes from existing sources and emissions from new sources shall be based on the source's maximum potential to emit. Tracking will include documentation of the type of emitting facility, owner of the facility, location of the source, NO_x emissions and, if available, other pollutant(s) emitted in tons/year, and other pertinent information deemed necessary by the WDEQ and BLM to ascertain change in total NO_x emissions. A record of active drill rigs, their location and drilling duration, will also be maintained.

- **Paleontology**

Contractors and their construction workers will be instructed about the potential of encountering fossils and the steps to take if fossils are discovered during project related activities. The illegality of removing vertebrate fossil materials from federal lands without an appropriate permit will be explained.

- **Soils**

Site-specific, predisturbance landscape characteristics, including soils, plant species composition, and plant cover data; and proposed reclamation seed mixes and application rates will be required by the Authorized Officer (AO) for applications in soil types that are difficult to reclaim. In addition, special efforts to increase the likelihood of successful revegetation may be required and could include:

- the collection and analysis of soil samples from disturbed areas to determine appropriate reclamation seed mixtures and the need for soil amendments.
- the addition of fertilizers or other soil additives to improve soil texture and productivity;
- topsoil stockpile seeding, mulching, or height reduction (to <3 feet) where topsoil is stockpiled for more than 3 months.

Reviews of erosion control structures, culverts, reclamation, etc., will be made by the Operator's personnel and BLM to assure compliance with requirements and goals.

As much as is reasonable, disturbances on the Monte-Leckman complex (Map Unit #106), Huguston-Horsley-Terada complex (Map Unit #116), stabilized dune, and alkaline soils will be avoided. Where this is not possible, more detailed erosion control and reclamation measures will be required in the reclamation plan for the APD or ROW.

Project related travel is restricted to constructed, surfaced roads when soils are saturated and rutting would occur on unsurfaced roads.

No well location shall be constructed with in 300 feet of the edge of Sand Draw, Granite Wash, or Alkali Draw or within tall sage brush areas associated with them. The goals are to avoid disturbance of sandy soils and to protect important sage grouse habitat. Roads and pipelines may cross the drainages at right angles as deemed necessary by the AO. Engineering design will address the specifics of these crossings on a site specific basis.

Release of fracturing fluids and condensates into flare pits will not be permitted. BLM and the Operator's personnel will ensure compliance through a routine inspection program.

- **Water Resources**

Increase sedimentation impacts to surface waters will be avoided or minimized through construction and erosion control practices approved with each authorization and prompt reclamation of disturbances.

All reserve pits will be lined unless an exception is granted by the AO. The Operators are encouraged to haul drilling fluids from one pit to the other, as much as is practical, in the place of using fresh ground water. BLM may, on a case-by-case basis, require that fracturing flow back fluid be contained in tanks and disposed of in an approved off-site location.

Fracturing and condensate fluids are not to be released into the flare pit or the surrounding area; they are to be confined in the reserve pit or tanks. It is envisioned, and is currently being done, that fracturing fluids will be flowed back into flat tanks large enough to contain the blowback. The condensate on top of the tanks would be shipped to production tanks and the remaining fracturing fluids put into the reserve pit (from the bottom of the tank) until the fluid volume of the flowback is reduced enough to permit flaring.

No well location shall be constructed within 300 feet of the edge of Sand Draw, Granite Wash, or Alkali Draw, or within tall sage brush areas associated with them, to avoid disturbance of erosive sandy soils and to protect important sage grouse habitat. Roads and pipelines may cross at right angles. Engineering design will address the specifics of these crossings on a site specific basis.

- **Noise and Odor**

All engines and compressor exhaust stacks are to be properly muffled according to manufacturer's specifications to reduce noise.

Housing for compressors and silencers on exhaust stacks may be required in the future if noise from compressor stations becomes a problem (e.g., sage grouse strutting activity is affected, noise is heard at residences, etc.).

- **Vegetation**

Well field traffic shall be confined, unless specifically authorized otherwise, to the running surface of roads and well pads as approved in APDs and ROWs. Well field traffic is prohibited on two-tracks when soils are saturated and rutting would occur.

Operators will assist BLM in the monitoring of reclaimed areas for successful revegetation.

- **Wildlife**

BLM will work with the Operators, ranchers, Wyoming Game and Fish Department (WGFD), and other interested parties to determine the need for and location of

additional water sources to enhance seasonal use of the area by pronghorn and sage grouse.

The inventory and monitoring of wildlife and wildlife use will be conducted as specified in the Wildlife Monitoring/Protection Plan (see Appendix D). Appropriate management actions will be taken to further protect wildlife and their habitats as deemed necessary.

- ***Raptor Nest Protection***

Nest Protection - A buffer zone will be maintained around *active* raptor nests to ensure that the future function of raptor nests and raptor recruitment of young are not adversely compromised. (An active raptor nest is defined as a nest that has been occupied at least once within the past 3 years.) Permanent structures such as well pads, roads, buildings, storage tanks, or overhead powerlines will not be allowed within 825 feet of active raptor nests, with the exception of active bald eagle nests for which the distance will be 2,000 feet. The buffer distance may vary depending upon the species involved, prey availability, natural topographic barriers, and line-of-sight distances. Linear disturbances, such as pipelines, seismic activity, etc., could be granted exceptions.

- ***Sage Grouse***

Lek Protection - Surface disturbance within 0.25 miles of a sage grouse lek (strutting ground) will be avoided. Linear disturbances such as pipelines, seismic activity, etc., could be granted exceptions. Annual field evaluations for sage grouse leks will be conducted by a qualified biologist provided by the BLM or the Operator prior to the start of activities in potential sage grouse lek habitat between February 1 and May 15. These field evaluations will be conducted if project activities will occur in potential sage grouse lek habitat during the specified period. BLM wildlife biologists will ensure that such surveys are conducted using proper survey methods at the proper time of year.

Nesting Protection - Field evaluations for sage grouse nesting will be conducted by a qualified biologist provided by the BLM or the Operator prior to the start of activities in potential sage grouse nesting habitat between April 1 and July 1. These field evaluations will be conducted if project activities will occur in potential sage grouse nesting habitat during the specified period. If an occupied sage grouse nest will be adversely affected by surface disturbing activities, surface uses and activities will be delayed in the affected area until nesting is completed. BLM wildlife biologists will ensure that such surveys are conducted using proper survey methods at the proper time of year.

Sage Grouse Winter Use Areas - To protect important sage grouse wintering areas, tall sagebrush areas primarily associated with Sand Draw, Granite Wash, and Alkali Draw, surface disturbance will be avoided. Pipelines or roads will cross drainages at right angles, to minimize disturbance.

- **Special Status Species**

The U.S. Fish and Wildlife Service (USFWS) concurs in the assessment that, provided the measures are implemented, where appropriate, and the ferret surveys are conducted pursuant to the USFWS 1989 Black-Footed Ferret Survey Guidelines, the project, as described, is not likely to adversely affect the black-footed ferret, peregrine falcon, whooping crane, or bald eagle. BLM will implement the following measures:

Black-Footed Ferret - If a proposed construction site would affect prairie dog colonies that might be suitable as habitat for black-footed ferrets, BLM will give the operator the option of relocating the project components to avoid direct impacts to prairie dog burrows. If this is not possible, BLM will require that a survey be conducted to locate black-footed ferrets in accordance with USFWS Survey Guidelines (USFWS 1989). If black-footed ferrets or their sign are discovered during surveys, all subsequent activities in the project area will be coordinated with USFWS.

Bald Eagles - To ensure protection of this threatened species, no permanent structures will be located within 2,000 feet of an active bald eagle nest site. The buffer distance may vary depending upon the species involved, prey availability, natural topographic barriers, and line-of-sight distances. BLM will require completion of a field survey in these areas prior to surface disturbing activities during the nesting season. No surface disturbing activity will be permitted within one mile of an occupied bald eagle nest.

Endangered Fish - The USFWS Colorado River Endangered Fish Recovery Program, where depletion of water in excess of 100 acre-feet from the Colorado River system occurs (USFWS July 5, 1994), requires a depletion fee be paid to help support the Recovery Program. The Jonah II Project Area would not result in any annual depletion of water from the Colorado River system, thus no payment is required.

Mountain Plover - Suitable mountain plover habitat within 0.25 miles of proposed well locations and within 300 feet of proposed roads will be surveyed prior to disturbance to detect the presence of plovers if the disturbance will occur between March 15 and August 15. If plovers are discovered, observations will continue to determine if nests are present. If no nests are present, no additional surveys will be conducted. If nests are discovered, surveys will be conducted no more than 14 days prior to the date that ground disturbing activities are initiated. Two surveys, 14 days apart, will be required if the disturbance would occur between April 15 and July 15.

Western Burrowing Owls - Prairie dog colonies within 0.5 miles of existing and proposed disturbance areas will be searched annually for western burrowing owls during June and July to determine the extent of owl nesting. The number of active nest burrows will be identified each year and efforts will be made to determine reproductive success for as long there is a concern with the impacts of development on the owls. The 825-foot buffer described for raptors will also be implemented for western burrowing owls.

Cedar Rim Thistle - All potential habitat for Cedar Rim thistle will be surveyed prior to disturbance. The plant and its habitat will be avoided if practical.

If the scope of the project is changed (i.e., the project is modified in a manner that may result in an effect to listed, candidate, or migratory bird species or their habitat, including black-footed ferret habitat, raptor nests, and mountain plover nesting habitat), BLM will contact the USFWS and the WGFD to cooperatively work with the project proponents to identify measures to protect these species, identify survey guidelines, develop appropriate

management plans, and minimize potential impacts.

- **Cultural Resources**

The primary tool for mitigation of impacts to cultural resources will be avoidance. All recognized eligible sites, areas of Native American concern, and other recognized sensitive areas, specifically Sand Draw and the NE 1/4 of Section 13, T. 29 N., R. 108 W. will be avoided as much as practical while permitting oil and gas development. Impacts that cannot be eliminated by avoidance will be mitigated on a case-by-case basis through pre-established methods. Mitigation may include data recovery, excavation, and/or Native American consultation/coordination for development in sensitive cultural resource areas, and costs for these effort will be born by the Operators. Excavation will be the primary form of mitigation to prehistoric sites whose importance is derived because of the data they contain. Unexpected discoveries will be handled on a case-by-case basis but salvage excavation of impacted materials will normally be required.

The BLM will consult with the Native Americans to identify areas of importance to them and then steps will be taken to avoid those areas as much as possible. Specifics of avoidance will be determined during and subsequent to consultation.

All development, except for road and pipeline crossings, within 300 feet of the edge of the drainage channels of Sand Draw, Granite Wash, and Alkali Draw is prohibited. Access to, occupancy, and use of areas with sensitive cultural resources and /or sensitive Native American concerns may be prohibited where adequate mitigation is not otherwise possible. Areas with sensitive cultural resources and/or sensitive to Native Americans will be managed with these values in mind.

The operators in cooperation with the BLM will conduct an educational program to inform employees and visitors about the regulations concerning cultural resource management and artifact collection. The BLM has placed informative signing on the access roads into the area.

Construction in archaeologically sensitive areas during frozen ground conditions will normally be prohibited, exceptions will be considered by the AO on a case-by-case basis and granted if appropriate.

Mitigation of effects to significant historic period cultural resources will be determined subsequent to consultation with all interested parties, recognizing the applicable significance criteria (36 CFR 60.4 [a] to {d}).

The Operators will be encouraged to enter into programmatic agreements, discovery plans, and /or individual project treatment plans. These plans could include geoarchaeological studies. In fact, a Draft Cultural Resource Management Plan is currently being prepared for the project.

BLM will increase law enforcement presence in the area to deter unauthorized collection of cultural materials.

- **Socioeconomics**

BLM will work with and encourage the Operators to plan proposed development operations so that seasonal restrictions do not create a significant reduction in the level of development causing seasonal workforce layoffs (i.e., work continues at a level rate year round).

- **Land Use**

Where proposed roads will follow existing roads, those portions of existing roads not included in the new road ROW and not needed by other users will be reclaimed and revegetated by the Operators, following Class III cultural resource surveys.

Adequate turnouts on new crowned-and-ditched roads will be built to provide access to existing two-tracks and other undeveloped roads.

- **Livestock Grazing**

All pits containing fluids will be fenced to keep livestock and big game from drinking any contaminated water.

- **Hazardous Material**

Operators will provide WDEQ-approved portable sanitation facilities at well locations until the wells are fitted for production and during workovers lasting more than 3 days.

- **Mitigation and Monitoring**

The Jonah II Operators will implement the resource protection, mitigation, and monitoring measures found in the Proposed Action, Transportation Plan, Reclamation Plan, and Wildlife Protection/Monitoring Plan. Monitoring inspections conducted by BLM and the Operators will be based upon the parameters identified in these documents. BLM and the Operator's personnel, Inspection and Enforcement personnel, and Environmental Compliance personnel, and/or periodic interdisciplinary teams will conduct monitoring inspections of construction and rehabilitation operations to ensure that the mitigation measures are effective and implemented.

Additional opportunities to mitigate residual impacts will be implemented where applicable. Opportunities include: road and trail reclamation/closure to restore wildlife habitat by ripping and seeding numerous two-tracks and unneeded primitive roads; reducing the extent of surface disturbance associated with well pads, access roads, and pipeline corridors but within safety standards; maximizing the success of reclamation and restoration of wildlife habitat by consulting with reclamation contractors and oil and gas operators for reclamation practices successfully applied in the Jonah II Project area and elsewhere.

- **Compliance Monitoring**

Several comments on the DEIS question BLM's ability to adequately assure adherence to authorizations during construction and reclamation of well pads, roads, and pipelines. To help alleviate this concern, the Operators, collectively or individually, will be required to name a sole point of contact by June 17, 1998 for BLM to deal with in correcting all surface resource concerns. BLM will name a project manager as well by June 17, 1998. This person will be the sole point of contact for the Operator's designated person.

Appropriate remedial action will be taken by the Operators in the event unacceptable impacts are identified. The Operators will conduct monitoring of project sites in cooperation with the BLM. Plans submitted by the Operator or their contractor, and with each APD, ROW, or appropriate permit application, will include monitoring provisions for the following: road construction to approved standards, reclamation success, annual review of wildlife use and/or changes

in use including listed or candidate species, or any threatened, endangered, or migratory bird species or their habitat in the area (including black-footed ferret habitat, raptor nests, and mountain plover nesting habitat), big game use, and sage grouse use. The reclamation monitoring program shall include written documentation for the effectiveness and success of reclamation mitigation. The Operators will monitor their reclamation to ensure that revegetation meets accepted standards set forth in the Reclamation Plan (Appendix B). Mitigation and monitoring measures may be modified by the AO as necessary to further minimize impacts. Final mitigation and monitoring requirements will be specified by the AO. BLM could require, as provided for in the lease terms, additional field studies or documentation of project sites to ensure that reclamation and other resource protection goals are met.

- **Authorized Officer**

The BLM Pinedale Resource Area Manager or her designee is the Authorized Officer for project surface and subsurface activities on BLM-administered lands.

Possible Mitigation Measures Not Accepted for Implementation

This section identifies what possible mitigation measures identified in the EIS that were not accepted for implementation.

- **Air Quality**

These mitigating measures were not accepted because WDEQ is the agency responsible for managing air quality in Wyoming. Therefore, BLM cannot require the following mitigating measures.

The air quality impact assessment evaluated potential mitigation measures to further reduce NO_x emissions for natural gas-fired, internal combustion compressor engines. The evaluation was not intended to rank or identify a required technology for the proposed compressors; the appropriate level of control would be determined and required by the WDEQ during the preconstruction permit process (e.g., limiting horsepower or NO_x BACT emission levels). For example, Table 4.2c in the FEIS presented the NO_x emissions levels under alternative well numbers compression horsepower, and NO_x BACT scenarios which could be used to reduce potential visibility impacts at the Prevention of Significant Deterioration (PSD) Class I Bridger Wilderness Area. In developing the emission inventory for the Jonah II Project Area assessment, it was assumed that compressor engines would have an average NO_x emission rate of approximately 2 g/hp-hr of operation. This reflects the use of current BACT determinations for similar emission sources. It should be noted that some Operators are currently using natural gas compressors with catalytic convertors that have NO_x emissions rates significantly less than 2.0 g/hp-hr. Alternate control measures available to Operators to reduce NO_x emissions include the following.

·Reducing the need for LOP compression by installing larger pipelines.
·Nonselective Catalytic Reduction.
·Lean Combustion.

·Selective Catalytic Reduction.
·Electric Compression (including solar power).
·Fuel Cell Technology.

·Centralized Well Gas Processing.
·Well Gas Flaring (VOC Control) of Condensate Tank Vapors
·Re-injection of Vented Well Gases.
·Natural Gas-Powered Drilling Rigs.
·Additional New Technologies.

In addition to these technology-based mitigation measures, there were natural resource management actions identified which could further mitigate potential air quality impacts. Other mitigation measures which might be considered to reduce air quality impacts are:

·Suspend Future Development Until Air Quality Issues Are Resolved.
·Withdraw or Prohibit Future Leasing.
·NO_x Emissions Cap and Trade.
·BACT on Existing VOC Sources.
·Phased (Staged) Development.

- **Noise and Odors**

Remote monitoring of selected wells and piping condensates and produced water to central collection points in order to reduce the number of trips and associated noise was not selected. However, BLM is reserving the right to require these mitigating measures on a case-by-case basis.

Improved separator/dehydrator units and/or VOC capture systems at condensate tanks to minimize potential odors was not selected for implementation. This possible mitigating option is up to WDEQ to require or not require during the evaluation and permitting process.

- **Wildlife**

Netting of all reserve pits will not be required.

A 0.5 mile seasonal avoidance buffer from March 1 through May 30 to further protect sage grouse leks was not selected for implementation.

- **Hazardous Material**

The option of requiring all pipelines left in place upon abandonment to be filled with a clay or cement slurry during the abandonment process is not accepted.

Rationale for Administrative Requirements and Conditions of Approval

This section briefly explains the rationale for the additional administrative requirements and conditions of approval.

- **Authorizing Actions**

Before implementation may occur, all necessary federal, state, and county permits must be obtained.

- **Site Specific Environmental Analysis**

Because the FEIS does not address all resource concerns site-specifically, further environmental review is necessary before the final location, mitigation, and monitoring needs for each well site, access road, gathering pipeline segment, or other facility can be determined.

- **Plans/Reports**

The specified plans and reports are requirements of state or federal regulation and

policy to ensure orderly implementation of planned development.

- **Transportation Plan**

The Jonah II Operators are required to provide to the BLM annual projections specifying proposed well and facility site locations and associated traffic requirements so the BLM can prepare annual transportation plan updates. This will ensure road locations are orderly and planned. This will allow BLM to eliminate unnecessary environmental degradation and to comply with existing Federal, State, and County requirements and restrictions developed to protect road networks, the traveling public, adjacent landowners and their property, and the natural resources.

- **Air Quality**

As required under the FLPMA and the Clean Air Act (CAA), the BLM shall not conduct, support, approve, license, or permit any activity which does not comply with all applicable local, state, tribal and Federal air quality laws, statutes, regulations, and implementation plans. In addition, the USDA-Forest Service, as the Federal land manager for the affected Bridger and Fitzpatrick Wilderness areas in the Wind River Mountain Range, has responsibility under the CAA, the Forest Service Organic Act of 1897, the Wilderness Act of 1964, the Forest and Range Renewable Resource Planning Act of 1974, and the National Forest Management Act of 1976 to protect wilderness areas against impairment. The Wilderness Act (and implementing Wilderness Area Air Quality Related Values Action/Monitoring Plans) requires that designated Wilderness Areas be managed in order to leave them unimpaired, with inconsistent uses held to a minimum. BLM's consideration of the 158.6 tons of $_{NO_x}$ per year responds to the USDA-Forest Service concerns pertaining to the potential for significant impacts to air quality related values within the Bridger and Fitzpatrick Wilderness areas under the mandates of the Clean Air Act, and in response to the Wilderness Act to ensure the protection of wilderness resources under Federal administration.

The Clean Air Act, 42 U.S.C. 7401 et seq., provides the framework for the protection of air quality through state regulatory programs approved by the Environmental Protection Agency. The 1977 amendments to the CAA established provisions for PSD of air quality, including Class I areas. The State of Wyoming has the authority and responsibility to regulate air quality impacts within Wyoming, including Class I areas. The primary goals for visibility protection which the state must follow are found in Sections 169A and 169B, of the CAA. It is the State's responsibility, through its EPA approved *State Implementation Plan* (SIP), to progressively work towards achieving the national goal of preventing and remedying any impairment of visibility in mandatory PSD Class I areas. The role of BLM and the USDA Forest Service in accomplishing this and in the administration of the wilderness area AQRVs, is to participate in the implementation, development and revisions of the SIP.

BLM recommends that the USDA Forest Service work with the State of Wyoming to protect air quality, helping to ensure no adverse impacts occur to PSD Class I areas administered by the USDA Forest Service.

Emissions Control - The air pollutant emission levels assumed for each well and compressor were based upon the analysis assumptions contained in the *Jonah II EIS - Revised Air Quality Technical Support Document* which

included the application of current BACT determinations for similar emission sources to VOC emissions at well sites and NO_x emissions from compressors. In addition, analysis assumed compliance with Wyoming Department of Environmental Quality's *Oil and Gas Industry Section 21 Permitting Guidance Document (June, 1997)*, i.e., requirements for existing, new and modified oil and gas production units under Wyoming Air Quality Standards and Regulations.

Well Site Emissions - The "Revised Air Quality Technical Support Document" (TRC, February 1998) provides the technical basis for the well site emission assumptions. Specific "near-field" modeling was conducted for particulate matter, sulfur dioxide, carbon monoxide, nitrogen dioxide, and hazardous air pollutants, and established the wellfield emission levels for these pollutants. The analysis assumed the application of BACT in permitting wells with VOC emissions greater than 20 tons per year.

Compressor Site Emissions - The Jonah II FEIS, based upon the Revised Air Quality Technical Support Document, concluded that 12,000 hp of compression (plus other cumulative sources) at 2.0 g/hp-hr would not cause perceptible (1.0) deciview) visibility impact to the Bridger Wilderness. However, under these same operating assumptions, the USDA Forest Service Limit of Acceptable Change (0.5) deciview) could be reached or exceeded on four days annually. No other air quality significance criteria would be exceeded.

If activity and corresponding emission assumptions and impacts exceed those used for the analysis, the BLM, in cooperation and consultation with WDEQ, EPA, USDA-Forest Service and other affected agencies, will undertake additional cumulative air quality environmental review as required by CEQ regulations 40 CFR 1502.9(c)(1)(ii).

Visibility Impact Mitigation - The Jonah II EIS *Cumulative Impact Analysis*, found that NO_x emissions associated with the development of the proposed natural gas projects (Jonah II, Fontenelle, Moxa Arch, Stagecoach Draw, and Jonah Prospect), when added to other existing and planned NO_x emissions in southwestern Wyoming, could result in a perceptible visual range reduction on 5 days annually (all during the winter) within the PSD Class I Bridger Wilderness Area.

However, based on the USDA-Forest Service established Limit of Acceptable Change of 0.5 deciview as a visibility impact threshold, potential Jonah II emissions, added to existing and proposed NO_x emission sources in southwestern Wyoming, could result in a perceptible visibility impact on 38 days annually within the PSD Class I Bridger Wilderness Area. This compares to 18 days at or above 0.5 deciview for the no action alternative. Modeling also indicated that total emissions of 158.6 tons of NO_x per year from the Jonah II Project Area would limit this impact to just one day, which is in accordance with the USDA Forest Service's Limit of Acceptable Change.

Through its responsibilities under the Wilderness and Clean Air Acts, the USDA-Forest Service has established a Limit of Acceptable Change for visibility of 0.5 deciview or greater to occur no more than one day per year in USDA Forest Service wilderness areas in Wyoming. The level of NO_x emissions for southwest Wyoming corresponding to this visibility limit to be 977 tons per year. The one day per year Limit of

Acceptable Change for visibility, then, was the basis for establishing 977 tons per year NO_x emissions as the level of concern for impacts to the PSD Class I wilderness areas (Fontenelle and Moxa Arch RODs). By its authority to regulate air quality impacts in PSD Class I areas through its EPA approved SIP, the State of Wyoming, pursuant to the CAA (Section 169A), will determine the validity of the concern and identify the appropriate remedy for preventing impairment of visibility in the PSD Class I Bridger Wilderness. BLM, in cooperation with the state and the USDA Forest Service, will work within the context of the EPA approved State air program to protect the air quality within the Bridger and Fitzpatrick Wilderness areas.

Atmospheric Deposition Impact Mitigation - The *Cumulative Impact Analysis* (Section 4.1.6 of the FEIS) found that NO_x emissions associated with the development of the proposed natural gas projects (Jonah II, Fontenelle, Moxa Arch, Stagecoach Draw, and Jonah Prospect) would be below applicable significance criteria set by the USDA Forest Service for atmospheric deposition. These criteria included potential terrestrial nitrogen deposition less than 3 kilograms/hectare/year (kg/ha/yr), terrestrial sulfur deposition less than 5 kg/ha/yr, lake acidity change less than 0.1 pH, and a change in lake ANC less than 10 percent (for lakes with background ANC above 25 microequivalents per liter (μeq/l).

The USDA-Forest Service's established Limit of Acceptable Change from human caused pollutants for lakes with existing ANC levels below 25 microequivalents per liter (μeq/l) is "no change" in the Bridger Wilderness. On this basis, the USDA-Forest Service indicated that any impacts from field development could exceed their Limit of Acceptable Change for any lakes with ANCs below 25 μeq/l.

No additional air quality mitigation was determined to be necessary to further reduce potential atmospheric deposition impacts to low ANC lakes for the following reasons: 1) no lakes with ANC values below 25 μeq/l were identified in the air quality impact assessment; 2) WDEQ requires air quality permits which would examine expected emissions from specific project components (such as compressors) prior to their construction; 3) WDEQ requires that a site-specific BACT analysis be conducted by the proponent as part of its pre-construction permit application and requires BACT be determined and applied in all air quality permits; and 4) all Federal actions associated with this project require additional site specific NEPA analysis by the Federal agencies which may identify additional emission control measures to ensure protection of air quality resources. These requirements will help mitigate potential NO_x emissions impacts.

Air Quality Mitigation Program - No additional air quality mitigation was determined necessary to further reduce potential air quality impacts for visibility, atmospheric deposition, or near field impacts (e.g., dust suppression, VOC and Hazardous Air Pollutants (HAPs) reduction) for the following reasons: 1) for the reasons listed above under "Atmospheric Deposition"; 2) because construction and operation would meet all applicable National Ambient Air Quality Standards and Wyoming Ambient Air Quality Standards; and 3) near-field pollutant concentrations during operation would not "overlap" between well locations, even with the densest assumed well spacing.

As previously described in the *Visibility* sections, a visibility level of concern has been identified due to total NO_x emissions from future permit authorizations (including rights-

of-way, sundry notices, and applications for permit to drill). These levels have been established at 977 tons per year of NO_x within the Rock Springs District, including the Jonah II, Moxa Arch, Fontenelle, Stagecoach Draw, and Jonah Prospect development areas and a total of 158.6 tons per year of NO_x emissions for the Jonah II Project Area. The total NO_x emissions level of concern of 977 tons per year corresponds to the USDA Forest Service recommendation and the 158.6 tons per year level is based on analysis reported in the FEIS. These limits would result in USDA Forest Service Limits of Acceptable Change for visibility (0.5 deciview) to be exceeded no more than one day per year. The NO_x emissions level of concern will remain at 977 tons per year for southwest Wyoming and 158.6 tons per year for the Jonah II PA until the State of Wyoming SIP, SWYTAF, or other information source, provide recommendations, that are acceptable by BLM, that they should be changed.

Operators will cooperate with BLM and WDEQ in determining when or if NO_x emission levels, from all activities within the BLM Rock Springs District (including the Jonah II, Moxa Arch, Fontenelle, Stagecoach Draw, and Jonah development areas), reach 977 tons per year above January 1, 1996 levels. If this level of emissions is reached, BLM will notify EPA, the USDA Forest Service, and the WDEQ that further emissions may have an adverse impact on air quality related values. Further, BLM, consistent with its letter of Agreement for Tracking Nitrogen Oxide Emissions with WDEQ dated June 20, 1997, and in cooperation and consultation with WDEQ, EPA, USDA Forest Service, and other affected agencies, will continue to track air quality in the affected region, and will verify the level of emissions, determine visibility impacts through additional modeling, and determine whether unanticipated visibility impacts are predicted or occurring in order to produce additional documentation that may be required under the National Environmental Policy Act (NEPA). BLM will use this information in making recommendations to EPA regarding air quality and to WDEQ regarding permitting for existing leases, and in making decisions regarding future leases on BLM-administered lands.

If visibility impacts are determined to be greater than predicted at 977 tons of NO_x and/or if increased contributions of other pollutants (such as volatile organic compounds (VOCs)) result in higher emission levels than stated in the BLM cumulative air quality impacts analysis, then BLM will conduct additional NEPA analysis and/or additional monitoring. The additional information will be used to make recommendations to WDEQ regarding permitting of further development under existing leases, as well as BLM decisions regarding future leases. To the extent authorized by the lease terms and federal or state law, operators may be required to cooperate in the implementation of a supplemental coordinated air quality monitoring program or emissions control program.

Air Quality Monitoring/Tracking Program - Based on the preceding descriptions of potential impacts, identified mitigation measures, and tracking program, no additional air quality monitoring requirements are necessary to measure and track potential air quality impacts. The BLM will continue to cooperate with existing visibility and atmospheric deposition impact monitoring programs. Additional monitoring needs may be identified by SWYTAF. If so, BLM will cooperate with WDEQ, EPA, and the USDA Forest Service to implement the identified

monitoring needs. BLM understands that the USDA Forest Service will be installing up to 3 new monitoring stations between Pinedale and South Pass in the near future.

It is also BLM's understanding that the Operators will be installing a meteorological station in or near the Jonah II Project Area to collect actual weather information.

The BLM will maintain communication with WDEQ to monitor NO_x emissions levels. Implementation will require close coordination between the Federal land management and state environmental regulatory agencies regarding receipt of applications for NO_x emitting sources and maintenance of the NO_x emissions inventory. WDEQ and the BLM will jointly monitor and track NO_x emission levels within the Rock Springs District (including the Jonah II, Moxa Arch, Fontenelle, Stagecoach Draw, and Jonah development areas) and share data with each other and other interested agencies as requested.

- **Paleontology**

To avoid unnecessary and undue impacts to the paleontology resource workers should be informed of the potential for encountering fossils and what steps to take if they do. It is illegal to remove any vertebrate fossil from public lands without a permit. This will be explained to workers so they will not inadvertently break the law.

- **Soils**

Reclamation success depends upon many site specific factors. BLM may need to require the Operators to collect this information and include it in their applications on a case-by-case basis. Erodible or hard to re-vegetate soils should not be disturbed any more than absolutely necessary, hence the restrictions on disturbing the Monte-Leckman complex, Huguston-Horsley-Terada complex, stabilized dune, and alkaline soils.

Project related travel is restricted to constructed, surfaced roads when soils are saturated and rutting could occur to avoid compacting the soil and accelerating soil erosion.

Sandy soils associated with Sand Draw, Granite Wash and Alkali Draw will be avoided except to cross at right angles, to minimize possible erosion and protect important sage grouse habitat. These soils are erosive, difficult to revegetate, contain buried cultural material, and supports tall sage brush which is important sage grouse wintering habitat.

- **Water Resources**

All reserve pits are to be lined, unless an exception is granted by the AO, to avoid migration of pit fluids beyond the pit. The Operators are encouraged to haul fluids from one pit to the other, as much as is practical, instead of using fresh ground water. The goals are to reduce the amount of fluids needing to be disposed of and to conserve freshwater. BLM may on a case-by-case basis require that fracturing flow back fluids be contained in tanks and disposed of in an approved off-site location if unacceptable impacts would occur if it was disposed of in the reserve pit. In any case, all fracturing fluids and condensate fluids are to contained in the reserve pit and not allowed in the flare pit or the surrounding area. This is required to prevent unnecessary impacts on vegetation and soils.

- **Noise and Odor**

All engines and compressor exhaust stacks are to be muffled to reduce noise. While there are no dwellings in the well field there are workers and other users. It is reasonable to reduce the amount of noise generated by engines and compressors via normal muffling procedures. Mufflers would reduce impacts on the ability of sage grouse to hear each other during the mating season.

- **Vegetation**

Vehicular traffic is limited to the running surface of roads and designated well locations as approved in APDs and ROWs. This is required to prevent undue impacts to vegetation, avoid soil compaction and accelerated erosion. Traffic on two-tracks are being restricted for the same reasons.

BLM and the Operators will monitor reclaimed areas to assure successful reclamation occurs.

- **Wildlife**

BLM will work with the Operators, ranchers, WGFD, and other interested parties to obtain additional water sources to increase seasonal use of the area by pronghorn and sage grouse. It is hoped that waters can be developed and maintained in a cooperative, voluntary manner with all interested parties being involved.

Inventory and monitoring of wildlife will be conducted as specified in the Wildlife Monitoring/Protection Plan (see Appendix D). Appropriate management decisions will be made to further protect wildlife and their habitats. The Operators made the Wildlife Monitoring/Protection Plan a part of the proposed action, so it will be implemented. It is impossible to foresee all threats to wildlife and their habitats at this stage of the project. BLM is preserving its options of making specific decisions in these unforeseen instances to protect wildlife and their habitat.

- ***Raptor Nest Protection***

The buffer zone established around raptor nests is to ensure the future functional use of raptor nests and raptor recruitment of young following construction and drilling operations. The buffer is in response to consultation with the USFWS and is based upon the findings of several research studies designed to determine raptor flushing distances due to human activity.

- ***Sage Grouse***

The sage grouse is the predominant and most important game bird in the analysis area. Data from the WGFD indicate that State-wide numbers of sage grouse declined between 1987 and 1992.

The entire analysis area is generally considered year-round habitat for sage grouse. Important habitat areas for these birds are strutting grounds (leks), brood-rearing areas, and wintering areas. Based on BLM and WGFD historical records and aerial inventories completed in the spring of 1996 and 1997, a total of 8 sage grouse leks were identified within the analysis area. Data from historical records suggest that nearly all of the leks identified within the analysis area were active within the past few years.

Lek Protection - To avoid displacing sage grouse from strutting, surface disturbance within 0.25 miles of a sage grouse lek (strutting ground) will be avoided. Also, to avoid enhancing raptor predation on strutting

sage grouse, permanent, high profile structures such as buildings, storage tanks, overhead powerlines, etc., will not be allowed within 0.25 miles of a lek (the area may be enlarged, if justified, on a case-by-case basis). Linear disturbances such as pipelines, seismic activity, etc., could be granted exceptions. The BLM and WGFD will continue to gather and evaluate information on sage grouse leks in potential sage grouse habitat between February 1 and May 15. These field evaluations for leks will be conducted to verify the lek activity. BLM and WGFD wildlife biologists will ensure that such surveys are conducted using proper survey methods at the proper time of year.

Nesting Protection - To avoid displacing sage grouse from nesting habitats, construction activities within a two-mile radius of active leks will be avoided from March 1 through June 30, or as designated by the BLM AO. The application of BLM seasonal occupancy restrictions will result in the avoidance of impacts to breeding and nesting activities, and implementation of a reclamation/habitat restoration plan will, over time, mitigate the long-term loss of sage grouse habitats.

Wintering Areas - Tall sage brush, primarily associated with Sand Draw, Granite Wash, and Alkali Wash, will be avoided, except to cross the drainages at right angles. This will be done to minimize disturbance of tall sage brush which is important sage grouse wintering habitat.

- **Special Status Species**

The measures listed under this section are required to comply with the Endangered Species Act. Species listed here and in the Proposed action, and Wildlife Monitoring/Protection Plan (Appendix D). Changes in the scope of the project that may result in an effect to listed, candidate, or migratory bird species or their habitat will require notification of the USFWS and the WGFD to cooperatively work with the project proponents to identify measures to protect and minimize potential impacts.

- **Cultural Resources**

The primary tool for mitigation of impacts to cultural resources is to avoid cultural sites because the site is not impacted and is left intact for future generations and study. If that is not practicable then impacts must be mitigated on a case-by-case basis or via pre-established methods. Excavation is the primary form of mitigation to prehistoric sites that can't be avoided. Unexpected discoveries will be handled on a case-by-case basis but salvage excavation will normally be required because the site has been impacted. Salvage excavation recovers what information remains and allows the action to proceed.

The BLM has consulted with the Native Americans to identify areas of importance to them as required by laws, regulations, and Executive Orders.

An educational program to inform employees and visitors about the regulations concerning cultural resource management and artifact collection is required of the Operators because of the sensitivity of the resource and laws prohibiting their disturbance and removal from public land.

Construction in archaeologically sensitive areas during frozen ground conditions will normally be prohibited because excavation is often required and it is extremely difficult, if not impossible, to do in frozen soils.

Mitigation of effects to significant historic period cultural resources will be determined subsequent to consultation with all interested parties. This is standard operating procedure for BLM.

The Operators will be encouraged to enter into programmatic agreements, discovery plans, and /or individual project treatment plans. These plans make decisions ahead of time therefore actions in the field can be carried out much quicker, especially when unexpected discoveries are made. A draft programmatic agreement has been prepared and work continues on getting it finalized. Geoarchaeological studies would enable predictions of cultural sites based on soil types.

Sandy soils, subject to accelerated erosion when disturbed, within 300 feet of the edge of the drainage channels of Sand Draw, Granite Wash, and Alkali Draw contain buried cultural material. Avoiding these soils will protect these cultural resources.

Patrols will be increased to deter illegal collecting of cultural materials.

BLM will work with the Operators to minimize impacts on sensitive cultural resources and/or areas sensitive to Native Americans. Where potential impacts to these resources cannot be adequately mitigated while allowing a proposed action, the use and occupancy of these areas may be prohibited entirely.

- **Socioeconomics**

BLM will work with the Operators to plan proposed development operations such that seasonal restrictions do not impact the associated workforce. BLM cannot force the Operators to drill year round. The boom-bust cycle is of extreme concern to the local workforce, towns, county, and to a lesser extent the entire State of Wyoming. BLM will work with the Operators to facilitate year round, constant development but it is beyond BLM's authority to require it.

- **Land Use**

Roads not needed by the Operators or other users will be reclaimed and revegetated by the Operators following Class III cultural resource surveys. This is required because of the concern about the number of roads in the area. Roads reduce the amount of forage available, causes accelerated soil erosion, and fragment wildlife habitat. Reclaiming unneeded roads is one way to reduce these impacts.

Adequate turnouts on new crowned-and-ditched roads to provide access to existing two-tracks and other undeveloped roads will be required. Ranchers pointed out that crowned-and-ditched roads often prevent them from accessing two-tracks with low clearance vehicles (trailers). This requirement is meant to eliminate that concern.

- **Livestock Grazing**

All pits containing fluids will be fenced to keep livestock and big game from drinking any contaminated water. This requirement is meant to protect livestock and big game animals in the event that harmful substances are in the pit.

- **Hazardous Material**

Portable sanitary facilities are being required because of concerns expressed in comments on

the EIS about human wastes being a problem after the wells are completed.

- **Mitigation and Monitoring**

This measure is intended to emphasize the importance of monitoring.

The EIS prepared on the Jonah II Natural Gas Development Project will guide implementation of the natural gas development; however, it is not the final environmental review upon which approval of all actions in the area will be based. Site specific environmental assessments (EAs) will be required for each well and associated access road, pipeline, and other actions in accordance with the BLM National Environmental Policy Act Handbook (H-1790-1). This provision for site specific evaluation of environmental protection needs will ensure that there is optimum consideration given to resource protection.

- **Compliance Monitoring**

Several comments on the DEIS question BLM's ability to adequately assure adherence to authorizations during construction and reclamation of well pads, roads, and pipelines. In order to help alleviate this concern, the Operators, collectively or individually, will be required to name a sole point of contact by June 17, 1998 for BLM to deal with in correcting all surface resource concerns. BLM will name a project manager as well by June 17, 1998. This person will be the sole point of contact for the Operator's designated person. Having a designated project manager for BLM, whose primary job will be to conduct compliance inspections, will help expedite identification and resolution of problems.

Because of the importance of mitigation to avoid or minimize adverse impacts, implementation of an intensive monitoring program is essential. The Operators and the BLM will provide representatives on the ground during and following construction to validate construction, reclamation, other approved design, and compliance commensurate with the provision of this decision.

- **Authorized Officer**

The explanation provided for who the AO is and what the AO's authority is.

Rationale for Not Bringing Identified Mitigation Forward

This section briefly explains what possible mitigation measures identified in the EIS were not accepted for implementation.

These mitigating measures were not accepted because WDEQ is the agency responsible for managing air quality in Wyoming. Therefore, BLM cannot require the following mitigating measures.

- **Air Quality**

The air quality impact assessment also evaluated potential NO_x mitigation measures to further reduce NO_x emissions for natural gas-fired, internal combustion compressor engines. The evaluation was not intended to rank or identify a required technology for the proposed compressors; the appropriate level of control would be determined and required by WDEQ during the preconstruction permit process (e.g., limiting horsepower or NO_x BACT emission levels). For example, Table 4.2c in the FEIS presents the NO_x emissions levels under alternative well numbers compression

horsepower, and NO_x BACT scenarios which could be used to reduce potential visibility impacts at the PSD Class I Bridger Wilderness Area. In developing the emission inventory for the Jonah II Project Area assessment, it was assumed that compressor engines would have a maximum NO_x emission rate of approximately 2 g/hp-hr of operation. This reflects the use of current BACT determinations for similar emission sources. It is noted that some Operators are currently using natural gas compressors with catalytic convertors that have average NO_x emissions rates 2.0 g/hp-hr. Alternate control measures evaluated in the FEIS that could be considered by WDEQ, the agency with jurisdiction for air quality within the State Of Wyoming, include the following:

· Nonselective Catalytic Reduction. This control technology is applicable to relatively new engines and requires the installation of catalysts in the engine exhaust. The catalyst removes between 80 and 90% of the uncontrolled NO_x emissions, for an operating emission rate of 1-5 g/hp-hr.

· Lean Combustion. This technology involves the increase of the air-to-fuel ratio to lower the peak combustion temperature, thus reducing the formation of NO_x (new engines and retrofit applications). The controls are between 80 and 90% efficient, for an operating emission rate of 1.5-4.0 g/hp-hr.

· Selective Catalytic Reduction. This is a post-combustion control technology which is only applicable to exhaust streams with significant oxygen content (a lean combustion engine). The controls are between 80 and 90% efficient, for an operating emission rate of 1.0-2.5 g/hp-hr.

The following additional mitigation measures could also be used by the Operators to further reduce potential air quality impacts:

· Reducing the need for LOP compression by installing larger pipelines.

· Centralized Well Gas Processing. To reduce VOC emissions, untreated gas from four or more wells could be transported by pipeline to a single central collection/treatment battery (separator and dehydrator units).

· Well Gas Flaring of Condensate Tank Vapors. Additional VOC control from condensate storage facilities, such as flaring of VOC emissions, could also be required, although NO_x emissions would likely increase.

· Re-injection of Vented Well Gases. Vent stream gases (i.e., gases released during venting/flaring) could be compressed to reservoir pressure then re-injected into the natural gas formation, essentially eliminating direct vent stream emissions. Typical vent stream emissions consist primarily of methane and small amounts of VOC and other trace gases. However, additional air pollutants (e.g., NO_x) would be emitted by operation of the re-injection compressor engines.

· Natural Gas-Powered Drilling Rigs. The use of natural gas-fired engines rather than diesel-powered equipment to power drilling rigs, mud pumps, and

associated equipment, is technically feasible for reducing emissions of particulate matter and VOC. However, NO_x emissions are likely to increase with the use of natural gas-fired engines due to potentially higher combustion temperatures.

· Electric Compression (including solar power). Using electric-powered compressor motors in place of the typical natural gas-fired compressor engines could essentially eliminate direct NO_x emissions from compressor station locations. However, increased NO_x emissions may occur at the point of electrical generation, often burning dirtier fuels and emitting more air pollutants (such as from coal-fired power plants). Photovoltaic (solar) electrical systems cannot achieve the power requirements necessary for gas compression proposed for the Jonah Field II project (12,000 hp). Specific cost estimates for electric-powered compression are not available, but the cost of providing sufficient, reliable electrical power to relatively remote compression locations plus the cost of the electric compressor motors and electricity, is expected to be prohibitive.

· Fuel Cell Technology. An evaluation of fuel cell technology was done as the result of Draft Environmental Impact Statement (DEIS) comments suggesting its use; however, the evaluation revealed that it is not currently feasible to connect enough fuel cells together to generate the compression horsepower necessary for the project. Currently, only two fuel cells have been connected in a series, at least six fuel cells would be required to operate a typical 1,500-hp compressor motor, and it would take nearly 48 fuel cells to provide the 12,000 hp of compression required for this project. Even if it were technically feasible, costs would make it uneconomic.

· Additional New Technologies. New technologies may become available during permitting which are not currently evident, and these technologies could be adopted by WDEQ to further reduce potential AQRV impacts.

Again, this evaluation was not intended to rank or identify a required technology; the appropriate level of control would be determined and required by the WDEQ during the preconstruction permit process.

In addition to these technology-based mitigation measures, there are natural resource management actions which could further mitigate potential air quality impacts. The following potential mitigation measures may be outside the jurisdiction of the BLM's management authority. It should be noted that reductions in NO_x emission rates will enable more wells to be developed which helps achieve the goal of maximum economic recovery of oil and gas.

· Suspend Future Development Until Air Quality Issues Are Resolved. The BLM can deny an individual APD only under very specific conditions. However, WDEQ (the primary air quality regulatory agency), under EPA oversight, would review potential air pollutant emission sources and issue any applicable emission permits prior to construction/operation. Without

their approval, the natural gas leases cannot be developed.

· Withdraw or Prohibit Future Leasing. Once the Secretary of the Interior has issued a valid mineral lease, it may only be conditioned (not revoked). Similarly, under current federal mineral law, future leasing can be prohibited only in specific circumstances. The U.S. Congress could revise these laws, but as stated in the FEIS, "the prospect of securing passage of such legislation and appropriation of funds for that specific purpose is extremely remote." In addition, elimination of natural gas leasing is inconsistent with Congressional direction (through the CAA) for development and promotion of alternative clean fuels needed to improve air quality nationally.

· NO_x Emissions Cap and Trade. Existing NO_x emission facilities could either keep, trade, or sell their emission allocations to other groups seeking to increase their NO_x emissions. When coupled with banking (holding, but not using credits) and discounting (reduced emission credit values with each trade), overall NO_x emissions would decrease. Under the CAA , Congress has already established an allowance program for certain sulfur dioxide (SO_2) emitting facilities, and Congress could establish a similar NO_x trading program to be implemented by WDEQ or EPA.

· BACT on Existing VOC Sources. Only WDEQ and EPA have the authority to regulate existing air pollutant emission sources, and even their authority is limited by law.

· Phased (Staged) Development. This suggestion is similar to the current USDA Forest Service-identified 977 tons per year NO_x emissions "level of concern" for all BLM-initiated or authorized activities within the Rock Springs District, including the Jonah Field II project. However, the 977 tons per year NO_x emissions "level of concern" regarding potential visibility impacts within the PSD Class I Bridger Wilderness Area is not a cap (upper limit) for authorized development on public lands in the Rock Springs District. The BLM recognizes that it does not have the authority to require that development of existing leases be limited when the emissions level identified by the USDA Forest Service (977 tons per year NO_x) is reached. Rather, it is the point at which re-evaluation shall occur to provide timely management review to ensure compliance with the federal land managers' mandate to protect AQRV through participation in state permitting of facilities.

- **Noise and Odors**

Remote monitoring of selected wells and pipeline condensates and produced water to central collection points in order to reduce the number of trips and associated noise was not selected because of the increased costs to resolve a minimal impact. Noise from vehicles traveling the oil field roads to check wells and in hauling out condensate is minimal and noise was not demonstrated to be a concern, except perhaps to strutting sage grouse. Sage grouse strut early in the morning before traffic begins to become a factor in hens being able to hear the booming males. Leks will be avoided by at least 1/4 mile,

therefore noise from vehicles would not interfere with their use of leks.

Improved separator/dehydrator units and/or VOC capture systems at condensate tanks to reduce odors was not selected for implementation because of the cost and minimal need to do so. There are no homes near the Jonah II project area, therefore any offensive odors would be very temporary to all visitors. Workers may experience longer exposure but no significant health risks were identified.

- **Wildlife**

Netting of all reserve pits will not be required. BLM policy requires the operators to maintain any pits with harmful fluids in them in a manner that will prevent migratory bird mortality. When it is in place netting provides the best protection but it is extremely difficult to keep in place due to high winds and heavy snows common in southwestern Wyoming. The Operators committed in the Proposed Action to adequately protect wildlife from accessing reserve, workover, and production pits potentially hazardous to wildlife.

A 0.5 mile seasonal avoidance buffer from March 1 through May 30 to further protect sage grouse leks was not selected for implementation. BLM has only somewhat recently been requiring the 1/4 mile buffer. While there are some with concerns that the current 1/4 mile buffer is not enough there is no evidence that the 1/4 mile is not sufficient, nor are there any studies to support the need for a 0.5 mile buffer.

- **Hazardous Material**

All pipelines left in place upon abandonment will be not be required to be filled with a clay or cement slurry during the abandonment process at this time. A state wide policy needs to developed on this issue. If and when it is accepted as a state wide policy then it will be implemented.

SUMMARY OF THE JONAH II NATURAL GAS DEVELOPMENT PROPOSED ACTION AND ALTERNATIVES

The Jonah II analysis area is located in Sublette County, Wyoming, as shown in Map 1.1. The area is located within the BLM Rock Springs District Pinedale and Green River Resource Areas. The analysis area is generally located within Townships 28 and 29 North (Ts. 28-29 N.), Ranges 107 through 109 West (Rs. 107-109 W.), 6th Principal Meridian. The Jonah II analysis area encompasses approximately 59,600 acres of federal, State, and private lands.

Alternative Selection Process

The Jonah II Natural Gas Project EIS analyzed three alternatives to the Jonah II Operators' Proposed Action; Alternative A (sensitive resource protection), Alternative B (maximum density of 4 well locations per section) and Alternative C (No Action).

The Proposed Action of drilling and developing 450 well locations in addition to existing drilling and production operations authorized by the Jonah EA.

Based on the current understanding of the natural gas reservoir characteristics (i.e., geology, flow data from existing producers, expected recovery factors, and economics), a maximum development level of eight wells per

section at 80-acre spacing is deemed appropriate for the Jonah II analysis area.

Proposed Action - The Jonah II *Proposed Action* would increase drilling production in the Jonah II analysis area through the development of up to 450 well sites in the next ten to fifteen years in addition to existing operations, as well as development of related roads, pipelines, and production facilities.

This scenario would allow Jonah II Operators to fully develop natural gas reserves to Wyoming Oil and Gas Conservation Commission (WOGCC) approved spacing requirements. The precise number of wells, locations of the wells, and timing of drilling would be directed by the success of development drilling and production technology, and economic considerations such as the cost of development of leases having marginal profitability.

The PA would be implemented over the 10- to 15-year planning period of 1997 through 2012. The development scenario would affect approximately 1,527 acres due to road/pipeline construction (180 miles with a 75-foot right-of-way), 121 acres from main road reconstruction, 16 acres from compressor stations, 5 acres from water wells, and 1,125 acres from well sites (450 well sites with 2.5 acres of disturbance per site) for a total disturbance of approximately 2,927 acres of land (5 percent of the Jonah II analysis area). The total area of disturbance would be reduced during the production phase through reclamation of disturbances associated with the unused portion of road rights-of-way and well sites, and total reclamation of pipeline rights-of-way. As such, under the PA, total disturbance would be reduced approximately 1,993 acres, from 2,927 acres to approximately 934 acres, assuming the development of all 450 well locations.

Original disturbance in the Jonah II analysis area from the construction of existing well sites, roads, pipelines, and facilities was approximately 457 acres in 1996, or approximately 0.8 percent of the total 59,600-acre analysis area. Cumulative long-term disturbance from implementation of the PA would be approximately 1,086 acres (1.8 percent of the analysis area).

Operators initially proposed a range of 150 to 450 wells, with 300 to 350 wells being the most probable number of wells to be in place at any one point in time. To prevent the underestimation of possible project impacts, analyses were conducted for the greatest possible number of wells (450) the Operators felt could be required to fully develop the project. Therefore, all impacts analyses contained in the EIS assumed 450 wells would be drilled and produced. Realistically there would likely be fewer wells, probably around 300. If this is the case, then all impacts identified herein would be overestimated.

Alternative A - *Alternative A* would provide a reduced-level development scenario of 420 additional production well sites in addition to existing operations, with related roads, pipelines, and production facilities.

Implementation of this alternative would involve 168 miles of new road and gas-gathering pipeline. Construction would involve 1,050 acres of well site disturbance, 121 acres of main road disturbance, 135 acres of sales pipeline disturbance, 5 acres of water well disturbance, and 16 acres of compressor station disturbance, for a total disturbance area of approximately 2,750 acres. As with the Proposed Action, a large portion of this area

would be reclaimed, thus reducing the total disturbance by approximately 1,872 acres to a total of 878 acres. This development scenario would be implemented over the ten to fifteen year planning period of 1997 through 2012. Cumulative long-term disturbance with the implementation of Alternative A would be approximately 1,030 acres, or 1.7 percent of the analysis area.

Alternative B - Four Well Locations Per Section

Alternative B would provide a reduced-level development scenario of 327 additional production well sites in addition to existing operations, with related roads, pipelines, and production facilities.

Implementation of this alternative would involve 1,145 miles of new road and gas-gathering pipeline. Construction would involve 842 acres of well site disturbance, 121 acres of main road disturbance, 133 acres of sales pipeline disturbance, 5 acres of water well disturbance, and 16 acres of compressor station disturbance, for a total disturbance area of approximately 2,262 acres. As with the Proposed Action, a large portion of this area would be reclaimed, thus reducing the total disturbance by approximately 1,538 acres to a total of 724 acres. This development scenario would be implemented over the ten to fifteen year planning period of 1997 through 20012. Cumulative long-term disturbance with the implementation of Alternative B would be approximately 876 acres, or 1.5 percent of the analysis area.

Alternative C - No Action - Alternative C, the *"No Action"* alternative, would allow the on-going natural gas production activities to continue by the BLM in the Jonah II Project area, but neither the Proposed Action nor Alternative A or B would be allowed. Transport of natural gas products would be allowed from those wells within the analysis area that are currently productive. Cumulative disturbance with the implementation of the No Action alternative would be limited to the existing unreclaimed disturbance area of approximately 236 acres, approximately 0.4 percent of the analysis area.

Analysis of the No Action Alternative provides a benchmark of existing environmental impact against which the decisionmaker can compare the environmental effects from the Proposed Action and Alternatives A and B. The No Action Alternative assumes no further authorizations for development would be granted on public lands within the Jonah II Project area. It would deny the actions proposed as well of any alternatives. Natural gas recovery would be limited to that presently being produced from active wells within the Jonah II Project area, and continued use and maintenance of access roads and pipelines within the project area.

Because the Jonah II Operators' leases and their proposals to develop their leases are in conformance with existing planning guidance for managing the area, and because the impact analysis demonstrates that the adverse impacts associated with the implementation of the development could be mitigated, the denial of development would not be a reasonable exercise of discretion. Unacceptable adverse impacts are not anticipated. The need to preclude a company from occupying the surface (as in the case of a lease with a No Surface Occupancy (NSO) stipulation) cannot be justified. Unnecessary degradation of public land resources will be avoided given the Jonah II lease terms and conditions, the lease stipulations, and the required APD, ROW, SN, TUP conditions of approval

identified through the Jonah II EIS.

The actions analyzed in the Environmental Impact Statement (EIS) concern development of existing leases (a valid existing right to develop the leased resource) issued to the Jonah II Operator's. To ensure the reviewing public understands, the DEIS included reference to judicial decisions pertaining to limitations on the BLM's authority to implement the No Action Alternative where the proponent has a valid existing right. Nevertheless, the Secretary of the Interior has the authority and responsibility to protect the environment within Federal oil and gas leases, and restrictions can be imposed on the lease terms by BLM. These restrictions appear in the form of lease stipulations, or in the case of post-lease situations where further protection of a resource is warranted, as the BLM's standard stipulations and conditions of approval (COAs) developed through the NEPA analysis process.

As explained in the FEIS, an oil and gas lease grants the lessee the right and privilege to drill for, mine, extract, remove, and dispose of, oil and gas deposits in the leased lands, subject to the terms and conditions incorporated in the lease. On land leased without an NSO stipulation, the Secretary of the Interior cannot deny the permit to drill but can only impose mitigation measures. In the absence of a No Surface Occupancy stipulation covering the entire lease, restrictions based on oil and gas lease operations must be "reasonable" and cannot directly or indirectly prohibit, altogether, the development of the lease. Although an individual APD can be denied, the right to drill and develop somewhere on the leasehold cannot be denied by the Secretary. To deny all activity may constitute a breach of contract and may violate an operator's right to conduct development activities on the leased lands. Authority for complete denial can only be granted by Congress, which can order the lease forfeited subject to compensation (*Union Oil Company of California v. Morton*, 512 F.2d 743, 750-51; 9th Cir. 1975).

Also, Federal Regulation 43 CFR 3162 - (*Requirements for Operating Rights Owners and Operators*) further constrains that which may constitute reasonable restriction in the development of a lease. The regulation states: "The operating rights owner or operator, as appropriate, shall comply with applicable laws and regulations; ... These include, but are not limited to, conducting all operations in a manner ... which results in maximum ultimate economic recovery of oil and gas with minimum waste and with minimum adverse effect on ultimate recovery of other mineral resources." (emphasis added).

Alternatives Considered but Not Analyzed in Detail

An alternative that included a well location density of 16 wells/section (40-acre spacing) was considered but rejected, since the current understanding of gas reservoir characteristics on and adjacent to the Jonah II Project Area do not yet indicate the need for 40-acre spacing and analyzing a 40-acre spacing scenario would overestimate anticipated environmental impacts. If a 40-acre spacing is deemed appropriate in the future, additional NEPA analyses would be required (e.g., a supplemental EIS).

A phased development alternative was considered and rejected, since the Proposed Action, as presented by Operators, involves the incremental development of the Jonah II Project Area. Wells would be developed as the extent of natural gas reservoirs is defined

and infill drilling would occur, as necessary, to ensure that gas production precedes in the most efficient manner. In addition, an alternative mandating the use of directional drilling was also considered but rejected since all alternatives considered in this EIS may involve the use of directional drilling to access natural gas reserves beneath areas with sensitive surface resources.

Alternatives involving fewer wells and associated facilities on the Jonah II Project Area were also considered. These alternatives were rejected because the extent of development necessary to recover existing natural gas resources on the project area is presently unknown. Therefore, limiting the number of wells could result in the by-pass of federal mineral resources and/or the necessity for future NEPA analyses.

Environmentally Preferred Alternative

In accordance with the CEQ Regulations for implementing NEPA (40 CFR 1505.2(b)), the environmentally preferred alternative must be identified in the ROD.

The environmentally preferred alternative for the Jonah II Project is the Preferred Alternative with selected mitigation measures described earlier, that would further reduce environmental impacts. The BLM believes that the Proposed Action promotes the national environmental policy as expressed in NEPAs Section 101. The Proposed Action will protect, preserve, and enhance historic, cultural, and natural resources equally as well as Alternative A or B. In addition, the Proposed Action: 1) best meets the BLM statutory mission under the Mineral Leasing Act and the Federal Land Policy and Management Act; 2) identifies additional and required mitigation which includes all reasonable and practicable means to avoid or minimize environmental harm from the proposed development; 3) includes an intrinsic mechanism by which further opportunity exists to reduce or minimize environmental harm; and 4) includes a monitoring and enforcement program which will be structured to ensure implementation and maintenance of necessary mitigation.

Also, selection of the Proposed Action as the Preferred Alternative is based on the analyses presented in the Jonah II Natural Gas Development Project EIS, which complies with the Pinedale and Green River Resource Management Plans and incorporates the commitment to implement specific mitigation measures. This selection is based on the analyses presented in this EIS and incorporates compliance with the Pinedale Resource Area (PRA) Resource Management Plan (RMP) (BLM 1988). Mitigation measures include the following:

1) applicant-committed mitigation/ environmental protection measures (DEIS Sections 2.1, 2.4, and especially 2.4.11);
2) Transportation Plan (Appendix A);
3) Reclamation Plan (Appendix B);
4) Hazardous Materials Summary (DEIS Appendix C);
5) Wildlife Monitoring/Protection Plan (Appendix D); and
6) additional mitigation measures identified for various resources selected in this ROD.

Besides the identified additional and required mitigation, the Proposed Action is environmentally preferred because it: 1) incorporates the added emphasis to comply with all Federal, State, and other regulatory requirements during construction, drilling, completion, and field production operations; 2) incorporates the consideration to modify

facility designs, construction techniques, operating practices, and abandonment and reclamation procedures to avoid or minimize environmental impacts; 3) incorporates EPA and Wyoming Department of Environmental Quality best management practices (BMPs) for storm water discharge prevention which will minimize off-site sedimentation and erosion by protecting soils; 4) provides recommendations on mitigation measures and assists with analysis of potential impacts, and BLM is working with USDA Forest Service, DEQ, and EPA to protect air quality related values within the Class I wilderness areas of the Bridger-Teton and Shoshone National Forests; 5) incorporates appropriate and reasonable measures from the draft and final EIS that provide further opportunity to avoid or reduce impacts, provide for monitoring and enforcement as an on-going activity by the agencies and Operators which will ensure implementation of the mitigation, evaluation of its functional effectiveness, and ensure successful reclamation; 6) incorporates proponent-committed project-wide measures for preconstruction planning and design (DEIS Section 2.4) and incorporates environmental standards, procedures and requirements for implementation of the Jonah II Area Natural Gas Development Project (Appendix C); 7) contains a Hazardous Substances Management Plan (Appendix C of the DEIS); 8) incorporates the Jonah II Transportation Plan and annual updates (Appendix A); 9) incorporates the Reclamation Plan (Appendix B); 10) incorporates the Wildlife Monitoring/Protection Plan (Appendix D); and 11) incorporates additional mitigation opportunities for the minimization of impacts to various resources.

The BLM believes that the analyses presented in this EIS demonstrate that the Proposed Action with accepted mitigating measures would meet the requirements of 43 CFR 3162.1(a), which directs Operators to conduct "all operations in a manner which ensures the proper handling, measurement, disposition, and site security of leasehold production; which protects other natural resources and environmental quality; which protects life and property; and which results in maximum ultimate economic recovery of oil and gas with minimum waste and with minimum adverse effect on the ultimate recovery of other mineral resources".

The preferred alternative is to permit up to 450 well locations at 8 wells per section (80-acre spacing) in the Jonah Field II project area. Approximately 180 miles of new roads with adjacent pipelines, 17 miles of improvements to the Burma and Luman roads, 4 compressor stations, 10 water wells, and 22 miles of sales pipeline would be authorized as well. Standard procedures as currently used in gas field developments throughout Wyoming and associated applicant-committed procedures would be employed during project development and operations. All project activities would comply with applicable federal, state, and county laws, regulations, and stipulations.

Development would occur on a yearlong basis provided there is adequate advanced planning and construction. Roads would be constructed upgraded, and maintained in accordance with the transportation planning process, approved road survey and design or gold book standards, and with Conditions of Approval in effect regarding timing and frozen or saturated soil restrictions described in the Transportation Plan for this project (see Appendix A). The Transportation Plan would be revised annually based on Operator plans and needs and public input.

Surveys for raptors and sage grouse would be conducted if activities are proposed between February 1 and July 31. Activities would be restricted within a 0.5-mile radius of active raptor nests, except ferruginous hawk nests, for which the seasonal buffer would be 1.0 mile. Surface structures requiring repeated human presence would not be constructed within 825 feet (2,000 feet (0.6 km) for bald eagles) of active raptor nests, where practical.

Surface disturbing activities would be avoided within 0.25 mile of sage grouse leks, and construction activities would be restricted within 2.0 miles of active leks from March 1 to June 30. High profile structures would not be constructed within 0.25 mile of a lek.

Compliance with the CAA would be accomplished through the State of Wyoming's permitting process. It is expected that various mitigating measures would be used to reduce regional NO_x emissions, thereby achieving the USDA Forest Service 0.5 deciview visibility Limit of Acceptable Change for the nearby PSD Class I Bridger Wilderness Area.

Based on reasonable but conservative analysis assumptions, the Jonah Field II Proposed Action could be operated in full compliance with the Clean Air Act and would not cause any significant (1.0 deciview) and adverse air quality impacts (see Table 1). However, when combined with other reasonably foreseeable cumulative impact sources, the Jonah Field II Proposed Action could cause perceptible visibility impacts (1.0 deciview) at the PSD Class I Bridger Wilderness Area on five days per year. (See Table 2). The USDA Forest Service Limit of Acceptable Change 0.5-deciview threshold would be reached or exceeded on 38 days per year when all cumulative impacts are considered (see Table 2). With the identified Jonah II Project total NO_x emission rate of 158.6 tons per year, the 0.5 deciview would only be reached on one day per year, which is in accordance with the USDA Forest Service's visibility Limit of Acceptable Change (see Table 1). However, even under the No Action Alternative, visibility impacts are predicted to reach or exceed the 0.5 deciview Limit of Acceptable Change on 18 days annually.

BLM recommended that the State of Wyoming control NO_x emissions by one or more mitigating measures. Examples of some potential emissions reduction options that may be used to reduce emissions to recommended levels are provided in Table 1. Additional options may become available and may be used to further reduce emissions; however, authority to require these measures lies with WDEQ. The project proponents will be required to meet WDEQ requirements for permits under the jurisdiction of the State of Wyoming.

MANAGEMENT CONSIDERATIONS

The decision to approve the Jonah II Project as described in the *Proposed Action* and subject to the above listed ROD administrative requirements and conditions of approval, will allow for the full development of the Jonah II natural gas reserve. This land use will become a dominate use, but not to the exclusion of other existing principal and major uses (i.e., domestic livestock grazing, wildlife development and utilization, mineral exploration and production, rights-of-way, and outdoor recreation) as defined in Section 103(l) of FLPMA. The Jonah II Project has been under development since early 1993 and will continue to be developed for the next 30 to 50 years until maximum recovery of the natural gas resource has occurred.

TABLE 1
SUMMARY OF NO_x EMISSIONS FROM ALTERNATIVE WELL NUMBERS, COMPRESSION REQUIREMENTS, AND BACT

Jonah Field II Natural Gas Development Project, Sublette County, Wyoming, 1997

Number of Wells	Well Emissions (tpy)	Assumed Compression (hp)	Assumed NOx BACT (g/hp-hr)	Compression Emissions (tpy)	Total Emissions (tpy)	Number of Days with Deciview ≥ 0.5	
450	29.4	12,000	2.0	208.5	237.9	4	[1]
			1.0	104.3	133.7	1	
			0.8	83.4	112.8	0	
			0.7	73.0	102.4	0	
300	19.6	8,000	2.0	139.0	158.6	1	[2]
			1.0	69.5	89.1	0	
			0.8	55.6	75.22	0	
			0.7	48.7	68.3	0	
150	9.8	4,000	2.0	69.5	79.3	0	
			1.0	34.7	44.5	0	
			0.8	27.8	37.6	0	
			0.7	24.3	34.1	0	
40	2.6	3,000	2.0	52.1	54.7	0	
			1.0	26.1	28.7	0	
			0.8	20.9	23.5	0	
			0.7	18.3	20.9	0	

[1] Preferred Alternative/Proposed Action.
[2] Most likely development level.

TABLE 2
POTENTIAL VISIBILITY IMPACTS FROM NO ACTION, PROPOSED ACTION, MOST LIKELY DEVELOPMENT, AND CUMULATIVE SOURCES

Jonah Field II Natural Gas Development Project, Sublette County, Wyoming, 1997

Action	Number of Days with Deciview ≥1.0	Number of Days with Deciview ≥0.5
No Action	0	18
Jonah Field II Alone (450 wells/12,000 hp compression)[1]	0	4
Jonah Field II Alone (300 wells/8,000 hp compression)[2]	0	1
Cumulative with Jonah Field II at 450 wells/ 12,000 hp compression[1]	5	38
Jonah Field II at 300 wells/8,000 hp compression[2]	2	29

[1] Preferred Alternative/Proposed Action.
[2] Most likely development level.

BLM recognizes the impacts that implementation of the Jonah II Project will have on surface resources, however, given the terms and condition for implementation, the residual impacts are considered acceptable. The trade-off is acceptable under NEPA, given that all practicable means to avoid and minimize environmental harm have been adopted. Implementation will occur in a manner which will "... create and maintain conditions under which man and nature can exist in productive harmony" (NEPA Sec. 101(a)).

The Proposed Action, as constrained by the ROD, in accordance with FLPMA, provides for the minimization or elimination of unnecessary and undue impacts resulting in acceptable residual impact. The Proposed Action as authorized in this ROD provides the best management balance for the multiple uses within the area of the Jonah II Project while sustaining a long-term yield, promoting stability of local and regional economies, maintaining environmental integrity, and conserving resources for future generations.

The resources with the potential to experience the greatest change or impact from the infill development are recreation, land use, social/economics, air quality, and wildlife habitat. Other resources that will also be affected, but to a lesser degree, are soils, vegetation, livestock grazing, and water quality.

The Proposed Action authorized in this ROD requires predisturbance planning for implementation, operation, and abandonment activities. This process will specify the means by which unnecessary and undue impacts are to be mitigated and the manner in which the natural resources are to be protected and enhanced.

In all, the BLM decision to approve the Jonah II Operators' field development proposal, as described under the Proposed Action and as constrained by the *ROD*, takes into account important management considerations, Federal Agency missions, as well as the fact that natural gas, as directed by the U.S. Congress and the President, is this Nations energy of choice to comply with the CAA amendments of 1990, and to help meet the public need for cleaner burning, less polluting natural gas. The Proposed Action as authorized in this ROD provides the best balance of these factors with the degree of adverse impact to the natural and physical environment. The development effort will help meet public needs for natural gas while at the same time allow humans to coexist with nature in a way that results in the least degree of irreversible, irretrievable commitment of resources. The long-term productivity of the area will neither be lost, nor substantially reduced, as a result of approving the Jonah II Project as constrained under the ROD. The only irretrievable resource will be natural gas.

The decision to approve the Jonah II Project includes careful consideration of the following factors:

a) consistency with land use and resource management plans;
b) public involvement, scoping issues, and draft and final EIS comments;
c) management considerations based upon relevant public comments received;
d) agency statutory requirements;
e) national policy; and
f) measures to avoid or minimize environmental harm.

A brief discussion on each of these factors follows.

a. Consistency with Land Use and Resource Management Plans - The proposed action is consistent with the Pinedale and Green River RMPS. Both RMPs acknowledge that oil and gas development could occur with the Jonah II Project Area and approve its development.

The BLM Environmental Impact Statement for the Pinedale Resource Management Plan (RMP EIS) (1988) projected a reasonable foreseeable development (RFD) for the Pinedale Resource Area within Sublette County of 900 new federal mineral estate wells above the existing (1985) level of 1,066 wells by the year 2005. It was assumed that drilling would continue as it had historically (i.e., 45 wells per year). Existing wells plus new wells would total approximately 1,966 federal wells in 2005. Based upon historic records, producing oil and gas wells in older fields would be abandoned at a rate of 16 wells per year or 35% in 20 years. The RMP EIS indicated that, based upon the information available at the time, the majority of development activity (90%) was expected to continue as it had historically - within or adjacent to currently producing areas (west of the Green River, between LaBarge Creek and Cottonwood Creek). However, the RMP EIS assumed oil/gas exploration and development could occur anywhere within the very high/high potential oil/gas areas.

The RMP EIS estimated an average short-term surface disturbance of 10.5 acres per location (well pad and access road) and 6 acres for rights-of-way (pipelines). For a producing well the RMP projected that approximately 5.0 acres of the pad and related access road, and all 6.0 acres of the pipeline right-of-way, would be reclaimed leaving 5.5 acres disturbed over the long term until the end of production and then reclaimed. Thus, for the 900 wells projected through the year 2005, this would mean 14,850 acres of initial disturbance (900 wells x 16.5 acres) and 4,950 acres of long-term disturbance (900 wells x 5.5 acres) following reclamation of the pipelines and portions of the pad and access road not needed for production operations. After factoring in 1,760 acres for reclamation of plugged and abandoned wells (320 wells x 5.5 acres per well), the cumulative net long-term disturbance would be 3,190 acres (4,950 acres - 1,760 acres) (see Table 3).

Although at the time the plan was prepared the indication was that 90% of oil and gas activity would occur west of the Green River in the Big Piney-LaBarge area, the RMP EIS analysis of potential resource direct, indirect, and cumulative impacts from oil/gas exploration/development, and the application of the *Wyoming BLM Mitigation Guidelines for Surface Disturbing and Disruptive Activities,* which prescribe resource protection measures necessary to mitigate impacts, were applied over the entire area of potential oil and gas development. The mitigation guidelines were developed primarily for the purpose of attaining statewide consistency in how measures are determined for avoiding and mitigating environmental impacts and resource and land use conflicts. These mitigation guidelines for resource protection have been updated in the Green River RMP. Therefore, the mitigation guidelines for the Green River RMP (completed October 1997) supplement the guidelines contained in the Pinedale RMP. The Green River RMP, covering the southeast portion of Sublette County, also analyzed an RFD that anticipates a high potential for development.

Since the completion of the Pinedale RMP, 656 wells have been drilled within the Pinedale Resource Area as of February 1, 1998. Of the 656 wells drilled, 590 are active (producing or capable of producing) and 66

have been dry holes (plugged and abandoned). Since 1985, 234 Federal wells have ceased to be productive and have been plugged, abandoned, and the pad and access road reclaimed. An additional 22 wells are in the process of being abandoned. The well abandonment rate has been about 44 percent or 20 wells per year. The total number of active Federal wells within the Resource Area at this time is approximately 1,370. To date, approximately 85% of the development activity has been within the area between Cottonwood and LaBarge Creeks, west of the Green River, and 15% outside the Cottonwood/LaBarge Creek area. Of the activity outside the Cottonwood/LaBarge Creek area, 73% (or 79 wells) has been in the Jonah I & II project areas and 27% (or 29 wells) has been in the balance of the Resource Area.

Actual average short-term surface disturbance has been 11.4 acres per location (i.e., 6.4 acres per pad and access road, and 5.0 acres per pipeline) for a total of 7,478 acres. For producing wells, long-term disturbance has averaged 3.7 acres for the pad and related access road for a total of 2,427 acres. Records show that gathering pipelines constructed between 1985 and 1997 have disturbed approximately 2,622 acres, all of which were stabilized and reclaimed within three years. Other transportation pipelines constructed within the Pinedale Resource Area (PRA), which add 308.1 acres of initial disturbance, 100% of which has been reclaimed, include the following:

- 1993 Northwest Pipeline Saddle Ridge Pipeline - total length of 15.9 miles; 144.5 acres of initial disturbance,
- 1994 Questar Birch Creek Pipeline - total length of 39.5 miles - 8.5 miles of which is in the PRA; 376.6 acres initial disturbance - 83 acres in PRA, and
- 1994 Jonah Prospect Sales Pipeline (total length of 28.6 miles - 12 miles in PRA; 192 acres total disturbance - 80.6 acres in the PRA.

After factoring 866 acres for reclamation of the plugged and abandoned wells (234 wells at 3.7 acres each), the net long-term cumulative surface disturbance is 1,561 acres (see Table 4).

The BLM is currently reviewing the RFD scenario in the Pinedale Resource Area RMP EIS. In addition to the RFD for oil and gas exploration and development activities, the BLM is also reviewing the reasonably foreseeable activities or actions involving other land use and resource management programs, like recreation, livestock grazing, wildlife habitat, etc. There may be direct or interrelated cause and effect relationships among all of these activities or actions that could require amending RMP decisions, other than just those related to oil and gas actions.

The BLM is also initiating talks with other known regional oil and gas Operators, to determine their drilling plans (outside the Jonah Field II project area) for the next couple of years. Based on the results of these discussions and the review of the RMP-identified RFD scenarios, the BLM will decide when to initiate a new EIS effort for additional project proposals. If the anticipated level of activity(ies) covered by the Pinedale Resource Area RMP EIS are likely to be exceeded by any one or more of these additional project proposals, the RFD scenario(s) for the RMP EIS will be updated. Analysis and evaluation of the updated RFD, in conjunction with the RMP, may lead to the amendment of some RMP decisions.

TABLE 3

RMP/EIS ASSUMPTIONS ON DISTURBANCE ASSOCIATED WITH OIL AND GAS DEVELOPMENT

Jonah Field II Natural Gas Development Project, Sublette County, Wyoming, 1997

	Acres Disturbed	Acres Reclaimed	Acres Disturbed Long Term
Total Initial Disturbance per Well	16.5	11.0	5.5
Well Pad & Road per Well	10.5	5.0	5.5
Pipeline per Well	6.0	6.0	0
Total Disturbance	14,850	9,900	4,950
P&A Wells	0	1,760	0
Grand Total	14,850	9,900	3,190

TABLE 4

ACTUAL DISTURBANCE ASSOCIATED WITH OIL AND GAS DEVELOPMENT

Jonah Field II Natural Gas Development Project, Sublette County, Wyoming, 1997

	Acres Disturbed	Acres Reclaimed	Acres Disturbed Long Term
Total Initial Disturbance per Well	11.4	7.7	3.7
Roads and Well Pad per Well	6.4	2.7	3.7
ROWs per Well	5.0	5.0	0
Total Disturbance	7,478	5,051	2,427
P&A Wells	0	866	0
Grand Total	7,478	5,917	1,561

The ultimate solution for updating the RFD scenarios in the Pinedale Resource Area RMP EIS is to include all existing and projected oil and gas development activities in the Big Piney-La Barge and Jonah areas, the proposed exploration activities of other Operators, and the projected and anticipated development throughout the entire PRA. When an updated RFD scenario is established, some analysis and evaluation would be conducted to determine whether modifications to the RMP EIS are necessary. The RFD update could result in a requirement to amend one or more RMP decisions. However, this cannot be determined until the RFD update is prepared and evaluated. Analysis assumptions used in the Pinedale Resource Area RMP EIS are listed in Appendix B (page 253) of the DEIS for the PRA RMP. (Based on monitoring data collected during the past 10+ years, some of these assumptions reflect erroneously excessive surface disturbance effects related to oil and gas activities which may need to be revised.) Cumulative impacts would include the impacts identified in all previous NEPA documents and the reasonably foreseeable projects in the PRA.

All proposed land and resource use and management actions must conform with RMP decisions. In the absence of conformance, actions must either be denied, modified so they do conform, or the RMP decisions must be changed. Changes to RMP decisions are made through established procedures that involve public notice, public input, and formal decision-making. These procedures are contained in the BLM 1617 Manual. Proposals analyzed in NEPA documents (environmental assessments or EISs) are reviewed for conformance with RMP decisions. Project- or site-specific NEPA documents are tiered to RMP EISs. The resulting decisions for proposals analyzed in project-specific NEPA documents can result in the need to change or amend RMP decisions. That is, if a project-specific EA or EIS decision does not conform with the specific RMP, part of the decision for the project would include the needed change(s) to the RMP decision(s). If the potential for amending the RMP is identified, planning process requirements are incorporated into the project-specific NEPA process. If this potential is not determined early in the NEPA process, project delays may result due to the additional planning requirements necessary for a Federal Register Notice of Intent to conduct a planning review of (or to amend) the RMP, and the required time frames for public notice and comment.

The RMP would need to be amended if any decisions need to be changed as a result of this EIS. This is not the case with this EIS however. The EIS will supplement the RMP in that the total number of wells (900) used in the RMP RFD scenario could be exceeded as long as the RMP decisions remains the same. The RFD scenario contained in the RMP is not a decision but rather a set of assumptions used to perform an analysis.

Our review of the RFD scenario indicates that wells are being drilled at a faster pace than the RMP projected. However the total amount of disturbance is much below (32%) what was projected in the RMP. Thus there is no reason to change any RMP decisions as a result of this EIS.

b. Public Involvement, Scoping Issues, and EIS Comments - Opportunity for public involvement was provided throughout the environmental process. A tour of the field and a public meeting was held in Pinedale was held on July 29, 1996. Scoping for issues and alternatives was formally initiated on July 12, 1996 with the publication of a Federal Register Notice of Intent. Thirty comment

letters were received in response to the scoping notice. A summary of the scoping issues is found on pages 1-14 through 17 of the *Jonah II Area Natural Gas Development Project Draft EIS.* Over 400 copies of the draft EIS were distributed to the public for review and comment on July 25, 1997. On August 18, 1997, a public open house and information meeting was held in Pinedale, Wyoming to inform attending public about the project and accept comments on the DEIS. Approximately 150 people attended. Concern was expressed about the cumulative effects on wildlife and air quality. Strong support for the Jonah II Project was expressed by the majority of those speaking.

A total of 43 comment letters were received by BLM on the draft EIS during the public comment period (July 25, 1997 through October 6, 1997). Individual comments (particularly those that presented new data or questions on new issues bearing directly on the effects of the proposed action and its alternatives) were identified and responded to in the final EIS.

In addition, an Air Quality Impacts Assessment Stakeholder's group was established and met several times to assist the BLM in identifying modeling assumptions and impact thresholds.

c. Management Considerations Based Upon Relevant Public Comments Received - Several comments on the final EIS raised similar concerns. These concerns have been grouped into areas of common concern and are addressed in Appendix E. All concerns have either been specifically provided for in the ROD or explanation provided in the response. Areas of foremost concern were:

1) Air Pollution Impacts Within High Mountain Wilderness Areas (Particularly Visibility and Acidification of Lakes) - Comments expressed concern that authorization of the Jonah II natural gas infill development project would cause serious impacts to the air quality related values of the wilderness areas within the Bridger-Teton and Shoshone National Forests.

2) Wildlife Impacts - Comments expressed concern that authorizations of the Jonah II natural gas infill development projects would cause harm to sage grouse.

3) Multiple Use Management - Many comments recognized the need and benefits of oil and gas development. Development and implementation should be in accordance with multiple-use management. Development should be done under strict controls which the public can review.

d. Agency Statutory Requirements - The BLM decision is consistent with all federal, state, and county authorizing actions required to implement the Jonah II Operators' proposed action. All pertinent statutory requirements applicable to this proposal were considered. These include consultation with the USFWS regarding threatened, endangered, and candidate species; coordination with the State of Wyoming regarding wildlife, environmental quality, and oil and gas conservation; and Sublette County Commissioners for coordination of construction and use permits.

e. National Policy - Private exploration and development of federal oil and gas leases is an integral part of the BLM oil and gas leasing program under authority of the Mineral Leasing Act of 1920 and the Federal Land Policy and Management Act of 1976. The United States continues to rely heavily on foreign energy sources. Authorization for the

lessees to exercise their rights in developing the oil and gas leases is necessary to encourage development of domestic oil and gas reserves to reduce the United States' dependence on foreign energy supplies. Also, natural gas is this Nation's "energy-of-choice" because it is clean burning and less polluting. Therefore, the decision is consistent with national policy.

f. Measures To Avoid or Minimize Environmental Harm - The adoption of the Proposed Action in this decision includes all practicable means to avoid or minimize environmental harm. The decision, to ensure that the environmental consequences of the field development activities will be minimal, includes not only the required environmental safeguards and resource protection measures prescribed by the Pinedale and Green River Resource Management Plans, it also includes the additional mitigating protection measures identified in the Jonah II Natural Gas Development Project draft and final EIS. The decision has given full consideration to all public, local, state, and other federal agency input. No substantive issues remain unresolved as raised by governmental agencies, industry, or individuals.

APPEAL

This decision may be appealed to the Interior Board of Land Appeals, Office of the Secretary, in accordance with the regulations contained in 43 CFR 3165.4(c). If an appeal is filed, the notice of appeal must be filed in this office (Bureau of Land Management, State Director, P.O. Box 1828, Cheyenne, Wyoming 82003) within 30 days of the date the notice of the decision appears in the *Casper Star Tribune.* The appellant has the burden of showing that the decision appealed from is in error.

If you wish to file a petition (pursuant to 43 CFR 3165.4(c)) for a stay (suspension) of the effectiveness of this decision during the time that your appeal is being reviewed by the Board, the petition for a stay must accompany your notice of appeal. A petition for a stay is required to show sufficient justification based on the standards listed in 43 CFR 3165.4(c). Copies of the notice of appeal and petition for a stay must also be submitted to the Interior Board of Land Appeals and to the appropriate office of the Solicitor at the same time the original documents are filed with this office. If you request a stay, you have the burden of proof to demonstrate that a stay should be granted.

SIGNATURE PAGE

FOR

JONAH II AREA NATURAL GAS DEVELOPMENT PROJECT

RECORD OF DECISION

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

Wyoming State Director

27 APR 1998
Date

APPENDIX A:
TRANSPORTATION PLAN

TRANSPORTATION PLAN
FOR THE JONAH FIELD II
NATURAL GAS DEVELOPMENT PROJECT

Prepared for

Pinedale Resource Area
and
Green River Resource Area
Rock Springs District
Bureau of Land Management
Rock Springs, Wyoming

By

TRC Mariah Associates Inc.
Laramie, Wyoming
MAI Project 11434

April 1998

TABLE OF CONTENTS

A-1.0 INTRODUCTION

A-1.1 OBJECTIVES

This transportation plan was prepared to supplement a proposal by oil and gas companies (Operators) to drill new wells in the Jonah Field II Project Area (J2PA), as described in the Jonah Field II Natural Gas Project Environmental Impact Statement (EIS). The document provides an assessment of future road development and use in and around the J2PA and potential impacts to the existing transportation system, and provides a basis for future oil- and gas-related exploration and production transportation planning within the area.

The transportation planning area (TPA) includes the J2PA plus adjacent areas that include roads which may be used to access the J2PA (Map A-1.1). The TPA includes U.S. Highway 191, 1.5 to 17.0 mi east of the J2PA, and State Highway 351, 6 mi north of the area. (More detailed maps of the TPA are available for review at the Pinedale Resource Area [PRA] and Rock Springs District, Bureau of Land Management [BLM] Offices.)

This document is an initial transportation plan, dealing primarily with corridors for proposed local and collector roads on and adjacent to the J2PA. The EIS discusses the projected well development within the area and associated impacts due to the development. Localized planning for each new well location would be necessary, and this document and applicable transportation codes and standards would be used in the localized planning efforts. Annual operational updates would be made during project development to detail specific localized transportation networks. All new or upgraded roads in the TPA would incorporate the general provisions of this planning document.

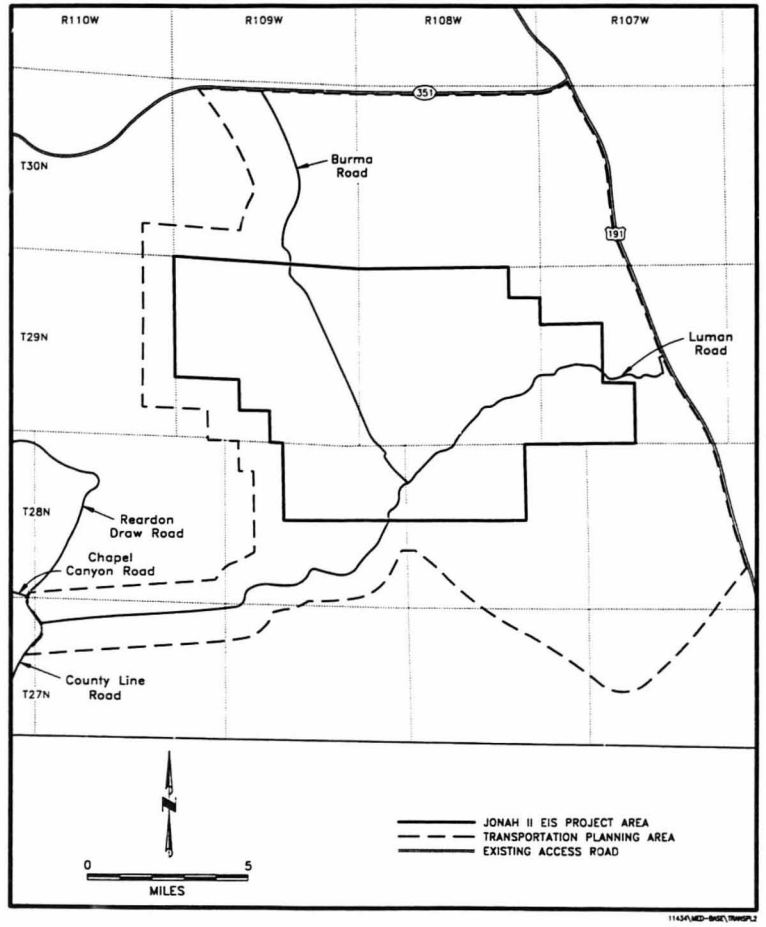
The objectives and content of this transportation planning document are listed and discussed below.

- The annual operational update process is described, including scheduling, responsibilities, and opportunities for public input.
- Existing roads in the J2PA are described, and primary routes (i.e., potential project-required collector and local roads) are identified on maps. High volume roads (i.e., local or collector roads) and resource, two track, and other unimproved roads are also discussed.
- Existing roads and road corridors that may be used as collector or local roads for the proposed project are identified.
- Existing natural gas pipelines in the J2PA are shown and pipeline development actions are presented.
- Natural transportation obstacles (e.g., steep terrain, drainages) and environmentally sensitive areas (e.g., sage grouse leks, raptor nests) are identified. These areas would be avoided, where practical, when determining the location of future high traffic volume transportation routes.
- Soils in the J2PA are identified, where known, and their limitations for project operations are presented. A brief description of field evaluation/observation methods for determining if a soil may have erosion, stability, or other problems is also presented.
- Road types are discussed by functional classification. Standard road surface, construction-related disturbance, and right-of-way (ROW) widths are provided in the EIS (see Figure 2.4).
- Maintenance and other agreements are discussed.

This document was prepared for the BLM by TRC Mariah Associates Inc. (TRC Mariah).

A-1.2 SCOPE

The scope of this plan includes a description of the existing road network, the general locations of proposed high traffic volume roads and corridors, and definitions of the road types. Relevant requirements for road construction or reconstruction are identified. A working plan is outlined to help determine the procedures for planning a road to serve a proposed well or group of wells, and the development of agreements for use and maintenance are outlined.



Map A-1.1 Transportation Planning Area.

This plan also applies to the transportation of gas, condensate, or water via pipelines within the area. Pipelines generally would be located adjacent to roads to reduce the total amount of new surface disturbance. However, this design may complicate road route selection, and in some instances, lead to increased environmental impacts. If this occurs, pipelines would be located along alternative routes. Further detail on pipelines is provided in Section 2.4.6 of the EIS.

Existing and improved access roads to the J2PA are under the jurisdiction of the BLM, who approves their design and requires their maintenance. Most roads within the J2PA also are under the jurisdiction of the BLM, and maintenance of these roads presently is conducted by Operators. This document describes the responsibility for road maintenance, and the type of maintenance is discussed generically (see Section A-9). Operators would provide the BLM with copies of road maintenance agreements that include the name of a designated contact person. Non-oil and gas roads would be maintained by the BLM or other ROW holder.

A-1.3 LIMITATIONS

- The condition (e.g., road design, upgrading requirements) and maintenance status (e.g., plowed) of existing roads and casual routes in the transportation network are identified on detailed maps available at area BLM offices. Many existing roads may not be passable during inclement weather or during winter months. All roads developed and required for this project would need upgrading, maintenance, and winter snow removal. Specific road upgrading and maintenance responsibilities would be identified in annual operational updates.
- Due to the sensitivity of paleontologic and historic/cultural resources, the known locations of these resources on and adjacent to the J2PA are not provided. Further detail on paleontological and historic/cultural resources would be collected prior to road development as a component of the Application for Permit to Drill (APD) and/or ROW application process.
- The transportation network described in this document is focused on local and collector roads and potential road corridors; however, existing low traffic volume resource roads and unimproved roads also are identified on the detailed maps available for review at area BLM offices.

A-2.0 PUBLIC INVOLVEMENT/TRANSPORTATION PLAN SCOPING

As a result of concerns identified during the preparation of past oil and gas development EISs in the region and associated Green River Basin Advisory Committee meetings, the BLM PRA requested public input on the transportation needs and concerns regarding access to the J2PA and surrounding areas. Input was requested in early January 1997, scoping letters and press releases were issued, and phone calls to potentially affected area users and management agencies were made. Those contacted include oil and gas operators; local and regional media sources; chambers of commerce; federal and state representatives; state and county transportation departments; the Wyoming Game and Fish Department and other state offices; regional libraries; recreation/conservation groups; and others commenting during scoping for the EIS. A complete list of contacts can be obtained from the BLM PRA office in Pinedale.

All comments received during the scoping process were considered in developing this transportation plan. Comments included the following.

- Roads should not be overdesigned.
- Pipelines should parallel roads.
- Pipelines and power lines should be buried.
- Unburied pipelines can spook horses and make off-road travel more difficult.
- Undesirable conditions along two-track roads (e.g., poor drainage crossings) should be repaired, and these roads should be eliminated if another road accesses the same area.
- Two-track roads that are not used and which can be reclaimed should be identified.
- Two-track roads should not be eliminated.
- Access to two-track roads from high traffic volume crowned-and-ditched roads should be maintained.
- High traffic volume crowned-and-ditched roads should be constructed such that vehicles with horse trailers can pull off the road at regular intervals and avoid parking in borrow ditches.
- Livestock and wildlife watering areas should be avoided.
- Sand Draw should be avoided.
- Sage grouse leks and associated buffers should be avoided.
- Noise impacts to sage grouse should be considered.
- Mule deer winter range west of the J2PA and east of the Green River may be impacted if access to the J2PA is through Reardon or Chapel Canyons.
- The TPA boundary should be extended westward to the Green River and southward to the Sweetwater County line.
- Sage grouse and mountain plover surveys should be conducted to better define desirable road corridors.
- Cattle guards should be cleaned out annually prior to May 1.
- The use of north/south-oriented roads should be maximized to accommodate pronghorn antelope movements.
- The use of looped roads should be minimized to avoid increased traffic.
- Turnout lanes and adequate site distances should be considered for existing and future high traffic volume access points.
- All roads developed for this project should be reclaimed when they are no longer required.
- Sublette County has no interest in acquiring any of the roads developed for this project.
- The ultimate road situation (i.e., after the project is completed) should be similar to predevelopment (pre-1990).
- The majority of large trucks currently access the J2PA using the Luman Road and the Luman Road should remain as the principal access road for large vehicles.
- The Burma Road currently is seldom used by large vehicles and should remain as such.
- Close the Burma Road or leave it unimproved if additional access to the J2PA is provided from the northeast.
- Southwest access to the J2PA is used primarily by light duty trucks.
- A road and pipeline corridor southwest of the J2PA would be required for the LOP, and an additional road and pipeline corridor may be required north of the J2PA.

This plan is available for review as an appendix to the Record of Decision (ROD) for the Jonah Field II Natural Gas Project. Additional input from interested parties would be incorporated in annual operational updates to the plan (see Section A-5.0).

A-3.0 ROAD ROUTE DESCRIPTIONS

There are two paved all-weather roads, which would likely provide access to the TPA--U.S., Highway 191 and Wyoming State Highway 351. The remainder of the roads are not paved and generally are not surfaced (e.g., gravel, aggregate). Some of these unpaved roads become impassable when wet and during winter, and if used as access for this project, would require improvements and increased maintenance, including snow removal. In addition, some realignment of these routes may occur to minimize impacts to sensitive resources, to ensure safety, and to maximize traffic flow efficiency. Map A-3.1 and the maps available for review at area BLM offices show the preliminary location of potential access routes and/or corridors (i.e., collector and local road routes with high initial traffic volumes) on the TPA. Where no suitable road currently exists, a corridor is shown in which the proposed access road would likely be located.

The following sections briefly describe the location and status of proposed road routes on the TPA that may be used to access the J2PA and in-field development sites. New roads and necessary improvements and realignments to existing routes would be specified in annual operational updates and all routes would be selected to ensure safety, maximize transportation efficiency, avoid sensitive environmental resources, and minimize road densities.

A-3.1 U.S. HIGHWAY 191

U.S. Highway 191 is the primary transportation corridor currently linking the J2PA (at the Luman Road) to regional communities (e.g., Pinedale, Rock Springs). While no improvements or upgrading are anticipated for this route, a turnout lane is proposed for construction in 1997 at its junction with the Luman Road. Any future access points (e.g., northeast and southeast access corridors) along Highway 191 must consider sight distances and turnout lanes. These action would be coordinated with the Wyoming Department of Transportation (WDOT).

A-3.2 WYOMING STATE HIGHWAY 351

Wyoming State Highway 351 runs east-west approximately 6 mi north of the J2PA. This road provides access to the J2PA via the Burma Road for the traffic traveling from the Big Piney/Marbleton area. No improvements currently are anticipated for Highway 351, but the need for improvements may be identified in the future. Turnout lanes and sight distances would be considered at the Burma Road junction and any future access points (e.g., northeast access corridor), and this action would be coordinated with the WDOT.

A-3.3 LUMAN ROAD

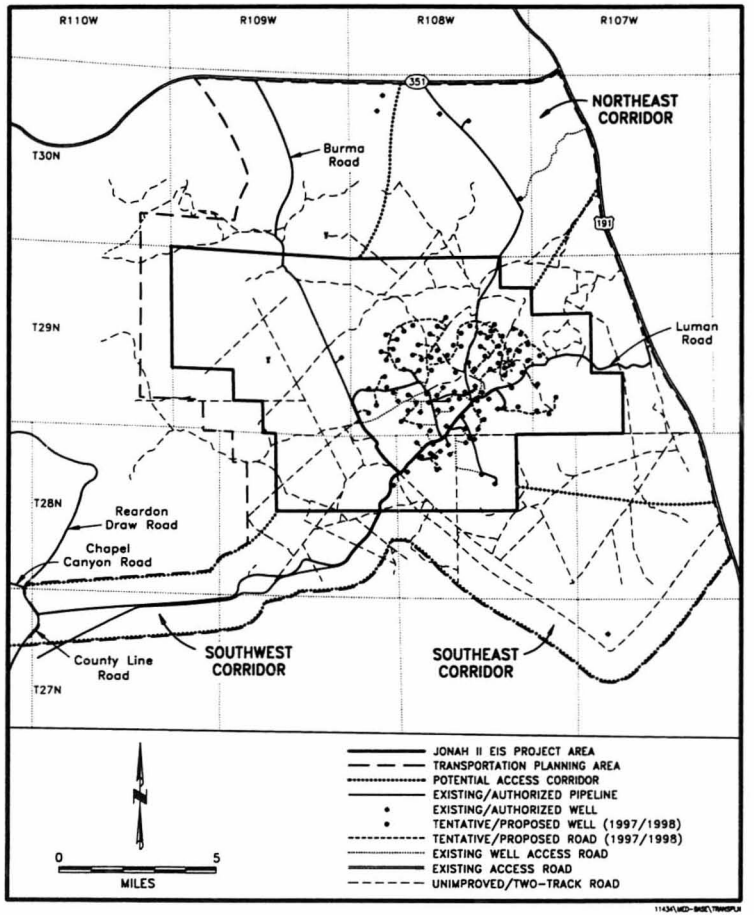
The existing, unpaved Luman Road links the J2PA to U.S. Highway 191 east of the area and is the primary field access route. This road is proposed for upgrading to local/collector road status (including gravel surfacing) from its junction with Highway 191 to Section 5, T28N, R108W. Road improvements are anticipated to be complete in early 1997. Additional improvement/maintenance work on the Luman Road would be identified in annual operational updates. It is anticipated that at field abandonment the road would remain in an upgraded condition.

A-3.4 BURMA ROAD

The Burma Road extends from Wyoming State Highway 351 south into the J2PA. Initial development plans indicated that this road would be upgraded to collector road status; however, current development plans indicate that this upgrade may be unnecessary. Therefore, only existing undesirable sections of the road (e.g., low water crossings, steep slope areas) currently are slated for improvement. These improvements would be completed in 1997, and any additional road upgrades/improvements would be specified in annual operational updates. The ultimate status of this road (i.e., at field abandonment) would be much the same as it exists today; however, all improvements to the road are anticipated to remain.

A-3.5 NORTHEAST ACCESS CORRIDOR

As the J2PA is developed, additional field access may be required to the northeast, linking the area to either U.S. Highway 191 or Wyoming State Highway 351. The exact location of this potential route has not yet been determined; however, it is anticipated that if the road is necessary, it would be located along an appropriate route within the corridor shown on Map A-3.1. Careful planning of road location would be necessary to avoid sensitive resources (e.g., raptor nests, sage grouse leks, cultural sites). It is



Map A-3.1 Transportation Planning Area with Potential Access Corridors, Existing, and 1997/1998 Tentative/Proposed Roads.

anticipated that this road, if developed, would be entirely reclaimed following field abandonment unless there is an identified need for the road by other area users.

A 4-inch surface gas sales pipeline currently is present within this corridor (see maps available at the BLM offices and Map 2.3 in the EIS). This pipeline would be replaced with a larger buried gas pipeline during project development. Further detail on pipeline development is provided in Section 2.4.6 of the EIS.

A-3.6 SOUTHWEST ACCESS CORRIDOR

An additional access route southwest may be constructed as the J2PA is developed. The road would be located at an appropriate location within the corridor shown on Map A-3.1 and would link the J2PA with the existing County Line Road. Access to the J2PA along this potential route would be restricted to the Whelan Bridge near LaBarge to avoid increased traffic in Reardon and Chapel Canyons. At field abandonment, the entire route would be reclaimed to conditions approximating those currently existing in the area unless there is an identified need for the road by other area users.

Two subsurface gas sales pipelines currently are present with this corridor (see maps available at the BLM offices and Map 2.3 of the EIS). It is anticipated that these pipelines would be replaced with larger pipelines or an additional subsurface pipeline would be constructed within this corridor. Further detail on pipeline development is provided in Section 2.4.6 of the EIS.

A-3.7 SOUTHEAST ACCESS CORRIDOR

If an access road to the southeast is deemed necessary for the proposed project, it would be constructed at an appropriate location within the corridor shown on Map A-3.1. There are many unknowns associated with the need for a road within this corridor, including those of area livestock operators. Its precise location, if required, would be shown in annual operational updates. If developed, this route is not anticipated to be a primary access road to the field. At field abandonment, the entire road would be reclaimed unless there is an identified need for the road by other area users.

A-3.8 ADDITIONAL LOCAL AND RESOURCE ROADS

Additional local and resource roads would be constructed on the J2PA as necessary and specified in annual operational updates. Where these new roads are shown to duplicate existing two-track roads, the exiting two-track may be reclaimed. At field abandonment, it is anticipated that most, if not all, newly constructed local and resource roads would be reclaimed unless there is an identified need for the road by other area users.

A-4.0 EXISTING AND PROPOSED TRANSPORTATION NEEDS

A-4.1 THE EXISTING NETWORK

The existing transportation network on the TPA is shown on Map A-3.1. This system includes three primary access roads, the Luman Road which connects the J2PA to U.S. Highway 191 east of the area, the Burma Road which runs north from the J2PA to State Highway 351, and an unnamed road running southwest of the J2PA to the County Line Road. Historic use of the roads has been limited primarily to livestock operators. The principle current use of these and other roads in the area is for oil- and gas-related traffic; however, other users include grazing permittees and recreationists (e.g., hunters, ORV users, rockhounds, people seeking solitude in the wide open spaces). The existing transportation system is generally suitable for all current users.

The Luman Road is utilized by all user groups, receives more use by large vehicles than any other road on the area, and is the most heavily used road in the area. Virtually all the heavy vehicle traffic in the J2PA is for oil- and gas-related activities.

The Burma Road is traversed by all users but is not currently suited for all-weather travel or large vehicles. The road receives less use than the Luman Road; however, there is a moderate amount of heavy truck use from LaBarge, Big Piney, and Marbleton during dry weather.

Traffic accessing the J2PA from the southwest is similar in volume and vehicle size as that occurring on the Burma Road. This access route is well-suited for all-weather traffic; however, the road itself is not (i.e., it requires all-weather surfacing). Vehicles currently traveling this route may access the route from Whelan Bridge in LaBarge or from Five Mile Bridge south of Big Piney and west up Reardon or Chapel Canyons. Existing traffic primarily uses the Whelan Bridge.

Undesignated two-track roads also may be used to access the area. These routes are used primarily by grazing permittees and recreationists (e.g., ORV users, hunters, solitude seekers). Grazing permittees primarily use the two-tracks to access water developments on the TPA.

Two pipeline routes deliver gas from the J2PA. One line runs north through Sand Draw, while the other is located adjacent to the unnamed road running southwest of the J2PA (see Map 2.3 in the EIS and maps available at area BLM offices).

A-4.2 PROPOSED NETWORK USE/MODIFICATION

The stages of a typical trip necessary for the J2PA transportation system are listed below.

A. Main movement (i.e., U.S. and state highway lanes for workers with destinations terminating in the J2PA).
B. Transition (i.e., turnout lanes, where there is a change in travel speed).
C. Distribution/collection (i.e., oil/gas field unit or ranch access roads; collector and local roads).
D. Terminal access (i.e., well location access roads; resource roads).

When planning transportation facilities, all of the described traffic stages can be identified within the system, but any stage could be eliminated if not needed (e.g., intermediate stages may not be necessary). Each movement stage is handled by a separate facility designed specifically for its function. Identifying the stages helps to plan traffic flows.

The TPA transportation network is not anticipated to experience problems at traffic stage changes, due to the relatively low volume of expected traffic (Table A-4.1). However, a turnout lane is proposed for 1997 construction at the junction of U.S. Highway 191 and Luman Road. The distribution by distance of traffic stage changes within the J2PA also eliminates the probability of congestion when vehicles turn from collector or local roads to well access roads. The well access roads are dispersed far enough apart and the traffic volumes are low enough that traffic congestion would be unlikely. Although traffic volumes on J2PA roads generally would be low, heavy vehicles would use the roads throughout the LOP, and without road upgrades, some of these vehicles may become stuck during inclement weather periods, causing traffic flow problems. The critical vehicle for this project would be the workover rig.

The estimated traffic requirements for each well are provided in Table A-4.1. Construction, drilling, and

Table A-4.1 Vehicle Characteristics and Number of Trips.

Truck Type	Average Weight (x 1,000 lbs)	No. of Wheels	Average Speed	Round Trips per Location	Total Round Trips[1] (x 1,000)
PROJECT DEVELOPMENT					
Location/Road Construction					
Semi	74	18	20	3	1.3
Gravel/haul	48	10	20	33	14.8
Pickup	7	4	30	47	21.2
Drilling Operations					
Semi	60	18	20	22	9.9
Fuel and mud	48	10	20	15	6.8
Logging and water	20	6	20	23	10.4
Pickup	7-8	4	30	133	59.8
Completion and Testing					
Semi	74-80	18	20	8	3.6
Haul A	48	10	20	33	14.8
Haul B	44	10	20	60	27.0
Haul C	20	6	20	21	9.4
Pickup	7-8	4	30	23	10.4
Development Total				421	189.4
OPERATIONS[2]					
Workover rig[3]	90	18	20	2	0.9
Haul	48	10	20	500	225.0
Pickup	7-8	4	30	237	106.6
Operations Total				739	332.5

[1] Assumes 450 wells are drilled and completed as producers.
[2] Assumes a well life of 20 years.
[3] The workover rig vehicle would be the largest vehicle (i.e., critical vehicle) required for the project.

completion activities, which have the greatest traffic requirements for the proposed project (an estimated 421 round trips per well over a 44-day period), would most likely be concentrated within localized areas during the first 10-15 years as the project is developed. The maximum number of round trips per day is estimated to be approximately 150 vehicles, and most of these vehicles would access the field from the Luman Road.

Localized construction and drilling activity would temporarily place heavy demands on road servicing. Traffic demands would be high in areas where drilling and completion activities are occurring, but would be minimal within other areas of the J2PA. Once all wells have been completed, traffic requirements would be minimal for the remainder of the LOP (i.e., averaging less than 20 round trips per day). Nonetheless, J2PA roads would be used continually until all wells in the area are abandoned and disturbed areas reclaimed.

A-4.3 ULTIMATE ROAD DISPOSITION

When the field is ready for abandonment (estimated to be approximately 40-50 years), the transportation network within the TPA would be reclaimed to appear much as it did prior to the development of oil and gas reserves in the area. Reclamation protocol are described in Appendix B of the EIS. Improvements to most existing roads likely would be maintained, and some roads identified as necessary or desirable for other area users (e.g., grazing permittees, recreationists) during annual operational updates may be retained.

Resource roads that may be retained after the LOP would be those that were identified during annual transportation planning as duplicating an existing two-track or other low traffic volume road for which these two-tracks or other roads were reclaimed. In addition, resource roads that are deemed necessary by the BLM for other area uses also may be retained.

The Luman Road likely would be retained in an upgraded status (local/collector road), as would improvements to the Burma Road. All other local/collector roads potentially developed as access routes for this project (i.e., potential roads in the northeast, southeast, and southwest corridors) are likely to be entirely reclaimed or returned to conditions similar to those occurring on the area prior to oil and gas development activities.

Road use following project completion likely would be limited to two of the three existing uses (i.e., grazing management and recreation), and responsibility for maintenance of roads would revert back to the BLM. A determination regarding the extent of post-project road maintenance (e.g., winter snow removal) on the TPA cannot be determined at this time since the level of future area use is unknown. Decisions would be made during the later years of the project based on public input received during annual update reviews.

A-5.0 ANNUAL OPERATIONAL UPDATES

Annual operational updates for the J2PA would begin in 1997 and annual updates would be available in January in each year thereafter until the project is completed or until the transportation system is so well established that further annual planning is not needed. Annual transportation planning would be conducted to determine the location and design criteria for roads to be developed on the area. This process would involve annual Operator projections for well and ancillary facility developments, public input, and updates on sensitive resources. With this information, the BLM would design a road network that accommodates Operator and other area user needs and minimizes potential impacts to sensitive environmental resources.

Operators would be required to provide to the BLM annual projections specifying proposed well and facility site locations and associated traffic requirements (e.g., estimated number of round trips; duration of construction, drilling, and completion activities; vehicle sizes) by October 15 of each year for the LOP (Table A-5.1). The BLM would evaluate this information, as well as known environmental constraints and other known uses of the area to develop tentative road locations and design criteria. A draft update with maps would be developed by the BLM and submitted to area Operators and other relevant land users by November 15 of each year. A meeting would be held with the Operators and other interested land users to discuss modifications to the proposed update to accommodate Operator and other user concerns, and public meetings would be held as deemed necessary by the BLM. All comments to the proposed annual operational updates would be received prior to December 15 of each year. A final update that considers all comments would be prepared and available for review in January of each year. Annual operational updates would be available for review at the BLM PRA and Rock Springs District Offices.

Geographic information system (GIS) technologies would be used to assist in the annual updating of the transportation network, as appropriate. Maps would be updated to incorporate new information (e.g., sensitive resource locations, existing and proposed road, well, pipeline, and ancillary facility locations). Existing roads designated for reclamation also would be identified. The BLM would make every effort to minimize the density of roads on the area while accommodating all land user requirements.

Information to be included in annual operational updates would include:

- the location of all existing wells, roads, pipelines, and other man-made features on the area;
- the location of all proposed wells, roads, pipelines and other project-required features to be developed within the next year;
- the location of all roads to be reclaimed during the next year;
- the anticipated traffic requirements for all existing and proposed developments;
- road types commensurate with BLM requirements (BLM 1985, 1991a) and proposed uses for all existing and newly developed roads on the area;
- identification of existing roads that require upgrades to accommodate existing and proposed traffic requirements;
- surfacing material source locations for road upgrades and maintenance; and
- the location of sensitive resources (e.g., drainages, raptor nest and sage grouse lek buffers) and environmental obstacles (e.g., steep slopes, erosive soils) (The precise locations of some environmentally sensitive resources [e.g., cultural and paleontological resource sites, raptor nests] may not be presented in reports to avoid unauthorized use; however, the locations of these resources and associated buffers would be considered during the planning process).

The final road route location and design criteria for all roads on the area would be included in APD and/or ROW applications, and would be subject to independent environmental reviews and National Environmental Policy Act analysis by the BLM. Some modification to proposed road locations specified in annual updates likely would occur as a result of these environmental analyses. Once a road has been constructed, its final location would be identified on maps in the annual operational updates.

During the later years of the project (years 20-50), it is anticipated that annual updates primarily would identify well locations and roads designated for

Table A-5.1 Annual Operational Update Responsibilities and Dates.

Action	Responsibility	Submittal/ Completion Date
Provision of information regarding annual proposed well, road, and facility site locations with traffic requirements and wells and roads to be abandoned	Operators	October 15
Evaluation of proposed plans	BLM, Operators	October 31
Draft update with maps prepared	BLM	November 15
Draft update review and public meetings	BLM, Operators, other interested parties	Late November - early December (as necessary)
Comment incorporation	BLM	December 15
Final update completion	BLM	January

abandonment and reclamation. The ultimate traffic network on the TPA is anticipated to appear much like the area appeared prior to natural gas development. However, public input received during the annual update process may recommend that some roads developed for the proposed project remain after the LOP. Roads that remain after the LOP would become the responsibility of the BLM. In addition, it is assumed that road upgrades of primary access routes would remain, and that most resource roads developed for this project would be reclaimed unless they are determined necessary for other area uses as identified during annual planning.

A-6.0 ROAD CLASSIFICATIONS

A-6.1 FUNCTIONAL ROAD CLASSIFICATION, GENERAL

The general functional road classification used in this document classifies roads according to a hierarchy of traffic movement within a traffic system. This classification is described in BLM Manual Section 9113 (BLM 1985), and does not necessarily depend on road condition.

A-6.2 FUNCTIONAL ROAD CLASSIFICATION

The road classification system used in this document is based on the one currently used by the BLM. The unique attributes of the roads within the TPA require the use of one or more unpaved collector roads. Due to the scarcity of existing all-weather roads within the TPA and the large tracts of land, some of the graveled or dirt BLM roads would be classified as collector or local roads. For example, Luman Road is identified as a collector/local road (see Map A-1.1). This road corridor would be improved to collector/local road status to meet transportation needs.

The road classification described below is derived from the BLM Manual Section 9113 (BLM 1985, 1991a). Figure 2.4 in the EIS presents some of the design criteria for the three road types proposed for this project.

A. Collector Roads. These roads normally provide primary access to large blocks of land and connect with or are extensions of a public road system. Collector roads usually require application of the highest standards used by the BLM. The design speed is 30-50 mph and the subgrade width is a minimum of 24 ft (20-ft full surfaced travelway).

B. Local Roads. These minimum volume roads usually provide the internal access network within an oil and gas field. The design speed is 20-50 mph and the subgrade width is normally 24 ft (20 ft full surfaced travelway). Low volume local roads in broken terrain may be single lane roads with turnouts.

C. Resource Roads. These normally are spur roads that provide point access. Roads servicing individual oil and gas well locations usually fall within this classification. These roads have a design speed of 15-30 mph and are constructed to a minimum subgrade of 16 ft (12-ft minimum full surfaced travelway) with intervisible turnouts. The subgrade width of resource roads is 16-18 ft, depending on the depth of surfacing materials and the travel surface. All resource roads in the J2PA would be a minimum of 14 ft wide when surfaced.

D. Casual Use Routes. Casual use routes are those that have not been constructed or maintained. They are usually created by repeated travel along the same route over time, and are often called two-tracks.

The public roads in the J2PA include two BLM roads: the Luman and Burma Roads. There are also numerous undesignated casual routes (unimproved/two-track roads) on the area and Operator-maintained well access (resource) roads (Map A-3.1).

Many of the existing casual routes within the J2PA may be upgraded and used as resource or local roads for natural gas development activities. Future resource roads (i.e., low traffic volume roads) are not specifically identified in this document due to the lack of site-specific details for the proposed project. Resource roads and future local roads would be identified during localized area transportation planning and would be specified in annual operational updates.

Proposed high traffic volume roads and/or road corridors (collector and local roads) are identified within this document (Map A-3.1) and on the GIS maps available for review at area BLM offices. Resource, two-track, and other unimproved roads which currently provide access to one or more existing wells or other facilities are also shown on the maps, as well as sensitive resource areas and other avoidance areas.

Annual operational updates would be used to determine the type of road standard and design parameters for new and/or upgraded roads. Design parameters for the three road types proposed for this project (i.e., collector, local, and resource roads) are shown in Figure 2.4 of the EIS and would be commensurate with BLM 9113 Manual specifications

(BLM 1985, 1991a). No roads required for this project would have travel surface widths of less than 14 ft.

The Operators anticipate that all roads upgraded or developed for this project would be designed, constructed, and surfaced to provide all-weather access. However, some local and resource roads initially may be constructed without appropriate surfacing material and, therefore, may become impassable during inclement weather. Operators would assume the risk of denied access to facility sites during inclement weather on roads that become impassable, since the BLM may deny access to avoid resource damage during periods when roads are unsuitable for travel.

The annual update process would minimize the number of roads by utilizing the best routes for local roads. Appropriately located local roads would avoid sensitive environmental resources where possible, shorten the length of resource roads, and deliver traffic to collector roads efficiently.

A-7.0 ENVIRONMENTAL CONSTRAINTS

There are many natural obstacles (e.g., steep slopes, poor soils for road construction, sensitive resources) throughout the TPA that pose problems with road construction and development. This section discusses several of the more formidable obstacles. Additional areas of concern likely would be identified during annual transportation planning and during ROW application review processes. Although roads could be constructed through many of the obstacles, these areas would be avoided, where possible, to avoid resource conflicts and augmented construction costs. The maps available for review at area BLM offices show the locations of the following natural and/or physical obstacles.

A-7.1 TOPOGRAPHIC CONSTRAINTS

In addition to the topographic obstacles listed below, there are many small dry lake beds and low-lying areas, small drainage channels, rock outcroppings, steep slopes, etc., that would be considered when choosing transportation routes within and adjacent to the TPA.

A-7.1.1 Steep Slope Areas

Steep slope areas occur throughout the TPA, and these areas would be avoided where possible to minimize erosion, visual resource, and biological resource impacts. Notable steep slope areas present in the TPA include Blue Rim, Stud Horse and Teakettle Buttes, and Ross and Yellow Point Ridges (see maps availabie at area BLM offices).

A-7.1.2 Playas

One playa lake is known to occur on the TPA on private land in Section 32, T29N, R108W, in the J2PA. This playa and others located during application review processes would be avoided where possible during construction to protect these unique landscape features.

A-7.1.3 Large Drainages

Crossing drainages is expensive and can cause adverse impacts if crossings are not appropriately designed and constructed. When it is necessary to cross a large drainage, an appropriate bridge, culvert, or low water crossing would be selected and designed to handle at least a 10-year flood. In addition, drainages and adjacent areas often contain significant cultural resource sites. Efforts would be made to limit the number of crossings. Large drainages within the TPA include Sand Draw, North Alkaline Draw, Granite Wash, East and West Buckhorn Draws, and Long Draw.

A-7.2 SOIL CONSTRAINTS

Site investigations and soil evaluations provide valuable information on soil types and limitations of the materials encountered on a road project. The extent of sampling and testing work required depends on the type and size of the road and soils characteristics. Lower standard roads (e.g., some resource roads) generally would not require auger borings, test holes, or extensive testing. Visual examination is generally sufficient for low traffic volume roads that would not carry frequent heavy loadings and for roads that appear to have soil types well-suited to road construction. Soils that generally cause problems are loose windblown sand, silt, and clay (fine-grained materials without the presence of gravel or rocky material). Fine-grained silts or clays are particularly troublesome when saturated. Sands cause problems when dry. The locality of known areas with stabilized sand dunes (i.e., sandy soil areas) are shown on Map 3.1 of the EIS.

Sands, silts, and clays may be difficult to distinguish when in combination, and intermediate silts have some characteristics of both sands and clays. Roads constructed on poor soils may perform well immediately after construction but then may lose stability by bearing failure (sand) or become too slippery or unable to support loads (clay) when wet.

Classifying soil types at proposed construction sites is valuable in predicting potential surface damage and determining the need for and type of surfacing material. Laboratory testing to determine the structural values of the soil may be advisable on roads requiring high traffic volumes and/or repeated heavy loads. Soils would be classified prior to road construction and specified with appropriate construction criteria in annual operational updates and/or ROW applications.

Known soils present on the J2PA are shown on maps available at area BLM offices. Most soils within the TPA have limitations for road construction, shallow excavations associated with pipeline construction, pond reservoir areas (reserve pits), and reclamation. Limitations were identified using criteria obtained from the U.S. Soil Conservation Service *National Soils Handbook, 603.15* (Soil Survey Staff 1983) (Tables A-7.1 through A-7.4).

Major soils within the TPA include the Garsid-Monte Association on 1-6% slopes; the Garsid-Terada-Langspring Variant complex on 0-6% slopes; the Vermillion Variant-Seedskadee-Fraddle complex on 0-3% slopes; and the Haterton-Garsid complex on 1-8% slopes. These mapping units collectively cover approximately 60% of the J2PA and occur extensively throughout the central and southern portions of the TPA. Limitations associated with these principal soils include shallow depth to rock, alkalinity, low strength, stoniness, excess lime, and shrink-swell potential (Tables A-7.5 and A-7.6). Steep slopes may limit development and reclamation potential in localized areas (Table 3.5 in the EIS), but these soils are typically located on gently sloping, undulating uplands.

Soils in the northwestern, north-central, and eastern portions of the J2PA occur in a complex mosaic across dissected topography, badlands, and streams. The Horsely-Badlands-Boltus complex on 15-65% slopes occupies dissected areas where the water erosion hazard is severe and soils are limited by shallow depths, low strength, and steep slopes (Tables A-7.6 and A-7.7 and Table 3.5 in the EIS). The Dines-Clowers-Quealman association on 0-3% slopes and the Monte-Leckman complex on 1-6% slopes occur adjacent to stream channels and on terraces and alluvial fans. These soils are limited by alkalinity, salinity, shrink-swell potential, stoniness, excess sand, and low strength.

Several associations (i.e., the Terada-Huguston-Fraddle, Monte-Leckman, Fraddle-Tresano, Huguston-Horsely-Terada, Garsid-Monte, Kandaly-Terada-Huguston, and Baston-Boltus-Chrisman complexes/associations) may be good sources for topsoil (see Table A-7.6). The Spool Variant-Ouard Variant-San Arcacio Variant, Fraddle-Ouard-Sand Arcacio Variant, and San Arcacio-Saguache complexes/associations may be good gravel sources (see Table A-7.6).

A-7.3 BIOLOGICAL CONSTRAINTS

Known sensitive biological resources present in the TPA include sage grouse leks, raptor nests, pronghorn antelope migration corridors, and various habitats suitable for threatened, endangered, and other sensitive species. As with other environmental constraints, these resource locations and their associated buffers, would be avoided, where possible, to minimize disturbance. In addition, inventories and monitoring of these resources would be conducted as specified in Appendix D of the EIS. The approximate known locations of these resources are shown on maps available for review at area BLM offices, and annual updates to this transportation plan would include updated, site-specific information on the location of these resources.

A-7.4 OTHER ENVIRONMENTAL CONSTRAINTS

Numerous paleontologic and cultural resource sites are known to exist on the J2PA. These sites would be avoided where possible during road improvement and construction activities. In addition, surveys for these resources would be conducted prior to construction, and monitoring of construction sites would be implemented as appropriate during development to avoid unnecessary disturbance.

Water developments (i.e., reservoirs, wells, and pipelines) occur throughout the TPA, and these locations are important for livestock and wildlife on the area. Roads developed and/or improved as a result of this project would avoid these locations, where possible, to minimize adverse effects to livestock and wildlife resources.

Table A-7.1 Criteria to Establish Soil Suitability for Drastically Disturbed Areas.[1]

	Rating[2]			
Parameter	Good	Fair	Poor	Restrictive Feature
Soil reaction (pH)	5.6-7.8	5.0-5.5 8.5-9.0	<5.0 >9.0	Too acid Too alkaline
Salinity (mmhos/cm)	0-8	8-16	>16 >8	Excess salt
Depth to cemented pan (inches)	>40	20-40	<20	Reclamation problems
Texture[3]	SL, L, SIL, SCL, VFSL, FSL, CL, SICL (<35% C)	CL, SICL, SC LS, LFS, LVFS	C, SIC, S, FS, VFS	Too clayey Too sandy
Soil adsorption ratio	0-5	5-12	>12	Excess sodium
Depth to bedrock (inches)	>40	20-40	<20	Reclamation problems
Erosion factor	<0.35	>0.35	>0.35	Erodes easily
Wind erodability group			1, 2	Soil blowing
Coarse fragments (% wt)				
3-10 inches	0-15	15-35	>35	Small stones
>10 inches	0-3	3-10	>10	Large stones, reclamation problems

1 Adapted from Soil Survey Staff (1983).

2 A rating of good means vegetation is relatively easy to establish and maintain, the surface is stable and resists erosion, and the reconstructed soil has good potential productivity. Material rated fair can be vegetated and stabilized by modifying one or more properties. Topdressing with better material or application of soil amendments may be necessary for satisfactory performance. Material rated poor has such severe problems that revegetation and stabilization are very difficult and costly. Topdressing with better material is necessary to establish and maintain vegetation.

3 U.S. Department of Agriculture Texture.

S	Sand	FSL	Fine sandy loam
VFS	Very fine sand	SL	Sandy loam
FS	Fine sand	SIL	Silt loam
LVFS	Loamy very fine sand	CL	Clay loam
LFS	Loamy fine sand	SICL	Silty clay loam
LS	Loamy sand	SCL	Sandy clay loam
L	Loam	C	Clay
VFSL	Very fine sandy loam	SC	Sandy clay
		SIC	Silty clay

Table A-7.2 Criteria Used to Establish Suitability for Pond/Reservoir Areas.[1]

	Limits			
Property	Slight	Moderate	Severe	Restrictive Feature
Texture[2]	SIC, C, SICL, CL, SC, SCL	L, SICL, CL, SIL, FSL, VFSL	SL, FSL, LS, S, LFS, gypsum	Seepage, piping
Permeability (inches/hr) (20-60 inches)	<0.6	0.6-2.0	>2.0	Seepage
Depth to bedrock (inches)	>60	20-60	<20	Depth to rock
Depth to cemented pan (inches)	>60	20-60	<20	Cemented pan
Slope (%)	0-3	3-8	>8	Slope

1 Adapted from Soil Survey Staff (1983). Pond/reservoir areas are areas that hold water behind a dam or embankment and, for this project, include reserve pits. Soils best suited to this use have a low seepage potential, which is determined by permeability and depth to fractured or permeable bedrock, cemented pan, or other permeable material. The soil is rated on its properties in the upper 60 inches as a natural barrier against seepage into deeper layers, without regard to cutoff trenches or other features that may be installed under the reserve pit. Excessive slope in the direction perpendicular to the axis of the pond embankment seriously reduces the storage capacity of the reservoir area. Furthermore, suitable sites may be difficult to find on slopes steeper than about 10%.

2 U.S. Department of Agriculture Texture.

S	Sand	SIL	Silt loam
LFS	Loamy fine sand	CL	Clay loam
LS	Loamy sand	SICL	Silty clay loam
L	Loam	SCL	Sandy clay loam
VFSL	Very fine sandy loam	C	Clay
FSL	Fine sandy loam	SC	Sandy clay
SL	Sandy loam	SIC	Silty clay

Table A-7.3 Criteria Used to Establish Suitability for Roadfill.[1]

Property	Limits			
	Slight	Moderate	Severe	Restrictive Feature
Depth to bedrock (inches)	>60	40-60	<40	Area reclaim
Texture[2]	--	L, SIL, FSL, VFSL, SCL, SC, SICL	CL, C, SIC	Low strength
Layer thickness (inches)	>60	30-60	<30	Thin layer
Fracture ≥3 inches (wt %)[3]	<25	25-50	>50	Large stones
Depth to high water table (ft)	>3	1-3	<1	Wetness
Slope (%)	0-15	15-25	>25	Slope
Shrink-swell	Low	Moderate	High	Shrink-swell

[1] Adapted from Soil Survey Staff (1983). Roadfill consists of soil material that is excavated from its original position and used in road embankments elsewhere. The evaluations for roadfill are for low embankments that generally are less than 6 ft in height and are less exacting in design than high embankments such as those along superhighways. The rating is given for the whole soil, from the surface to a depth of about 5 ft, based on the assumption that soil horizons will be mixed in loading, dumping, and spreading. Soils are rated as to the amount of material available for excavation, the ease of excavation, and how well the material performs after it is in place. Soil properties that affect the amount of material available for excavation are thickness of suitable material above bedrock or other material that is not suitable. The percent of coarse fragments more than 3 inches in diameter, the depth to a high water table, and the slope are properties that influence the ease of excavation. A high content of gypsum can cause piping or pitting. Some damage to the borrow area is expected, but if revegetation and erosion control are likely to be difficult, the soil is rated severe.

[2] U.S. Department of Agriculture Texture.

L	Loam	SICL	Silty clay loam
VFSL	Very fine sandy loam	SCL	Sandy clay loam
FSL	Fine sandy loam	C	Clay
SIL	Silt loam	SC	Sandy clay
CL	Clay loam	SIC	Silty clay

[3] Weighted average to 40 inches.

Table A-7.4 Criteria Used to Establish Suitability for Shallow Excavations.[1]

Factors Affecting Location and Use	Limits			
	Slight	Moderate	Severe	Restrictive Feature
Texture[2]	L, SIL, CL, SCL, SICL	SL, FSL, SI[3], SC, all gravelly types	C[4], SIC[4], S, LS, organic soils, all very gravelly types	
Soil drainage class	Excessive to well	Moderately well	Somewhat poorly to very poorly	Wetness
Depth to high water table (ft)	>6.0	2.5-6.0	<2.5	Ponding, wetness
Flooding	None, rare	None	Subject to flooding	Floods
Slope	<8%	8-15%	>15%	Slope
Depth to bedrock (inches)[5]	>60	40-60	<40	Depth to rock
Stoniness (classes)	0, 1	2	3, 4, 5	Stones
Rockiness (classes)	0	1	2, 3, 4, 5	Rocks

[1] Adapted from Soil Survey Staff (1983).

[2] U.S. Department of Agriculture Texture. If soil contains a thick fragipan, duripan, or other material difficult (but not impossible) to excavate with handtools, increase the limitation rating by one class unless it already is "severe."

S	Sand	CL	Clay loam
LS	Loamy sand	SICL	Silty clay loam
L	Loam	SCL	Sandy clay loam
FSL	Fine sandy loam	C	Clay
SL	Sandy loam	SC	Sandy clay
SIL	Silt loam	SIC	Silty clay
		SI	Silt

[3] If soil will stand in vertical cuts like loess, reduce rating to "slight."

[4] If friable like some kaolinitic clays, reduce rating to "moderate."

[5] If bedrock is soft enough to excavate with ordinary handtools or light equipment such as a backhoe, reduce "moderate" and "severe" ratings by one class.

Table A-7.5 Soil Characteristics for Known J2PA Soils.[1]

Map Unit No.	Slope	Map Unit Component	Range Site	Depth (inches)	Texture[2]	Reaction pH	Salinity (mmhos /cm)	Erosion Factors[3] K (Water)	Erosion Factors[3] WEG (Wind)	Erosion Hazard
100	15-65%	Horsley	Shale	0-3	L	7.4-9.0	2-4	.15	8	High
				3-9	L, CL, SCL	7.4-9.0	<16	.37	4L	--
				9+	Shale	--	--	--	--	--
		Boltus	Shale	0-11	C, CL	7.9-9.0	8-16	.32	4	High
				11+	Shale	--	--	--	--	--
101	8-40%	Haterton	Shallow loamy	0-3	L	7.9-9.0	2-4	.37	5	Moderate
				3-12	L	7.9-9.0	2-4	.43	--	--
				12+	Siltstone	--	--	--	--	--
		Garsid	Loamy	0-22	L, CL	7.4-9.0	2-4	.32	4L	Moderate
				22+	Shale	--	--	--	--	--
		Tasselman	Shallow loamy	0-1	SL	7.4-9.0	2-4	.24	3	Moderate
				1-7	GR-SL, CN-SL, SL	7.4-9.0	2-4	.10	3	--
				7+	Hard sandstone	--	--	--	--	--
102	1-10%	Langspring Var.	Loamy	0-10	L	7.9-8.4	<2	.32	4L	Low
				10-22	CL, SCL, L, SL	8.5-9.0	<2	.32	--	--
				22-30	SCL, L, SL	7.9-8.4	<2	.32	--	--
				30+	Sandstone	--	--	--	--	--
		Langspring	Loamy	0-9	L	7.9-8.4	<2	.32	4L	Low
				9-26	SCL, L, SL	8.5-9.0	<2	.32	--	--
				26-40	SCL, L, SL	7.9-8.4	<2	.05	--	--
103	1-12%	Terada	Loamy	0-7	VFSL, FSL, LS	7.4-8.4	<2	.32	3	Low
				7-34	VFSL, FSL	7.4-9.0	<2	.32	--	--
				34+	Sandstone	--	--	--	--	--
		Huguston	Shallow loamy	0-9	SL, FSL	7.4-8.4	2-4	.32	2	Moderate
				9+	Soft sandstone	--	--	--	--	--
		Fraddle	Loamy	0-4	SL	6.6-7.8	<2	.24	3	Low
				4-22	SCL	6.6-7.8	<2	.28	--	--
				22-34	SL, SCL	7.4-8.4	2-4	.28	--	--
				34+	Soft sandstone	--	--	--	--	--
105	0-2%	Fluvents	Saline lowland	N/A	N/A	--	--	--	--	Low

Table A-7.5 (Continued)

Map Unit No.	Slope	Map Unit Component	Range Site	Depth (inches)	Texture[2]	Reaction pH	Salinity (mmhos /cm)	Erosion Factors[3] K (Water)	Erosion Factors[3] WEG (Wind)	Erosion Hazard
106	1-6%	Monte	Loamy/	0-2	L	6.6-9.0	<2	.24	5	Low
			saline upland	2-60	CL, L, SL	7.9-9.0	<2	.24	--	--
		Leckman	Loamy/	0-3	FSL, VFSL	7.9-9.0	<2	.32	4L	Low
			saline upland	3-60	FSL, VFSL	7.9-9.0	<2	.32	--	--
108	0-3%	Dines	Saline upland	0-4	SIL	>7.8	8-16	.37	6	Low
				4-21	SIL, SICL	>8.4	8-16	.37	6	--
				21-60	SIL, SICL	>8.4	>16	.37	--	--
		Clowers	Loamy	0-1	L	7.9-9.0	4-8	.37	4L	Low
				1-60	CL	7.9-9.0	4-8	.49	--	--
		Quealman	Loamy	0-2	FSL, L, CL	7.4-8.4	<2	.32	3	Low
				2-60	SR-LS-L-FSL	7.9-9.0	<2	.37	--	--
110	1-8%	Fraddle	Loamy	0-4	SL	6.6-7.8	<2	.24	3	Low
				4-22	SCL	6.6-7.8	<2	.28	--	--
				22-34	SL, SCL	7.4-8.4	2-4	.28	--	--
				34+	Soft sandstone	--	--	--	--	--
		Tresano	Loamy	0-2	SL	6.6-7.8	<2	.24	3	Low
				2-16	SCL	6.6-9.0	<2	.24	--	--
				16-60	SL	7.4-8.4	2-4	.28	--	--
113	1-8%	Haterton	Shallow loamy	0-3	L	7.9-9.0	2-4	.37	5	Moderate
				3-12	L	7.9-9.0	2-4	.43	--	--
				12+	Siltstone	--	--	--	--	--
		Garsid	Loamy	0-22	L, CL	7.4-9.0	2-4	.32	4L	Moderate
				22+	Shale	--	--	--	--	--
114	1-8%	Ouard	Shallow loamy	0-1	SL, SCL	6.6-7.8	<2	.24	3	Low
				1-19	SCL	6.6-7.8	<4	.28	--	--
				19+	Shale-sandstone	--	--	--	--	--
		Ouard Variant	Shallow clayey	0-4	CL, L	6.6-7.8	<2	.32	6	Low
				4-16	CL, C	7.4-9.0	<2	.37	--	--
				16+	Shale	--	--	--	--	--
		Boltus	Shale	0-11	C, CL	7.9-9.0	8-16	.32	4	Moderate
				11+	Shale	--	--	--	--	--
116	6-30%	Huguston	Shallow loamy	0-9	SL, FSL	7.4-8.4	2-4	.32	2	Moderate

Table A-7.5 (Continued)

Map Unit No.	Slope	Map Unit Component	Range Site	Depth (inches)	Texture[2]	Reaction pH	Salinity (mmhos /cm)	Erosion Factors[3] K (Water)	Erosion Factors[3] WEG (Wind)	Erosion Hazard
				9+	Soft sandstone	--	--	--	--	--
		Horsley	Shale	0-3	L	7.4-9.0	2-4	.15	8	Moderate
				3-9	L, CL, SCL	7.4-9.0	<16	.37	4L	--
				9+	Shale	--	--	--	--	--
		Terada	Loamy	0-7	VFSL, FSL, LS	7.4-8.4	<2	.32	3	Moderate
				7-34	VFSL, FSL	7.4-9.0	<2	.32	--	--
				34+	Sandstone	--	--	--	--	--
119	1-6%	Garsid	Loamy	0-22	L, CL	7.4-9.0	2-4	.32	4L	Low
				22+	Shale	--	--	--	--	--
		Monte	Loamy	0-2	L	6.6-9.0	<2	.24	5	Low
				2-60	CL, L, SL	7.9-9.0	<2	.24	--	--
120	1-12%	Kandaly	Sands	0-1	LFS, LS	7.4-8.4	<2	.32	2	Moderate
				1-60	FS, LS	7.4-8.4	<2	.28	--	--
		Terada	Loamy	0-7	VFSL, FSL, LS	7.4-8.4	<2	.32	3	Low
				7-34	VFSL, FSL	7.4-9.0	<2	.32	--	--
				34+	Sandstone	--	--	--	--	--
		Huguston	Shallow loamy	0-9	SL, FSL	7.4-8.4	2-4	.32	2	Moderate
				9+	Soft sandstone	--	--	--	--	--
121	1-6%	Garsid	Loamy	0-22	L, CL	7.4-9.0	2-4	.32	4L	Low
				22+	Shale	--	--	--	--	--
		Terada	Loamy/sandy	0-7	VFSL, FSL, LS	7.4-8.4	<2	.32	3	Low
				7-34	VFSL, FSL	7.4-9.0	<2	.32	--	--
				34+	Sandstone	--	--	--	--	--
		Langspring Variant	Loamy	0-10	L	7.9-8.4	<2	.32	4L	Low
				10-22	CL, SCL, L, SL	8.5-9.0	<2	.32	--	--
				22-30	SCL, L, SL	7.9-8.4	<2	.32	--	--
				30+	Sandstone	--	--	--	--	--

Table A-7.5 (Continued)

Map Unit No.	Slope	Map Unit Component	Range Site	Depth (inches)	Texture[2]	Reaction pH	Salinity (mmhos /cm)	Erosion Factors[3] K (Water)	Erosion Factors[3] WEG (Wind)	Erosion Hazard
122	0-6%	Baston	Clayey	0-3	FSCL	8.0-9.0	<2	.37	3	Low
				3-28	C	>8.4	<4	.37	--	--
				28+	Shale	--	--	--	--	--
		Boltus	Shale	0-11	C, CL	7.9-9.0	8-16	.32	4	Moderate
				11+	Shale	--	--	--	--	--
		Chrisman	Clayey/ saline upland	0-2	SIC, C, SICL	7.9-9.0	<2	.37	.4	Low
				2-60	SIC, C, SICL	>7.8	<4	.37	--	--
123	4-25%	Spool Variant	Shallow sandy	0-6	LFS, GR-SL	6.6-7.3	<2	.20	2	Moderate to high
				6-12	LFS, CN-LFS,	6.6-7.8	<2	.28	--	--
					GR-SL, GR-S	--	--	--	--	--
				12+	Sandstone	--	--	--	--	--
		Ouard Variant	Shallow clayey	0-4	CL, L	6.6-7.8	<2	.32	6	Moderate
				4-16	CL, C	7.4-9.0	<2	.37	--	--
				16+	Shale	--	--	--	--	--
		San Arcacio Variant	Loamy	0-4	SL	6.6-8.4	<8	.24	3	Low to moderate
				4-14	SCL, SL	6.1-8.4	<2	.28	--	--
				14-25	LCOS, COS, GRV-S	6.6-8.4	<4	.10	--	--
				25+	Soft sandstone	--	--	--	--	--
124	3-8%	Fraddle	Loamy	0-4	SL	6.6-7.8	<2	.24	3	Low
				4-22	SCL	6.6-7.8	<2	.28	--	--
				22-34	SL, SCL	7.4-8.4	2-4	.28	--	--
				34+	Soft sandstone	--	--	--	--	--
		Ouard	Shallow loamy	0-1	SL, SCL	6.6-7.8	<2	.24	3	Low
				1-19	SCL	6.6-7.8	<4	.28	--	--
				19+	Shale-sandstone	--	--	--	--	--
		San Arcacio Variant	Loamy	0-4	SL	6.6-8.4	<8	.24	3	Low
				4-14	SCL, SL	6.1-8.4	<2	.28	--	--
				14-25	LCOS, COS, GRV-S	6.6-8.4	<4	.10	--	--
				25+	Soft sandstone	--	--	--	--	--

Table A-7.5 (Continued)

Map Unit No.	Slope	Map Unit Component	Range Site	Depth (inches)	Texture[2]	Reaction pH	Salinity (mmhos /cm)	Erosion Factors[3] K (Water)	Erosion Factors[3] WEG (Wind)	Erosion Hazard
125	0-3%	San Arcacio	Sandy/loamy	0-3	SL, COSL	6.6-8.4	<8	.24	3	Low
				3-14	SCL, SL	6.6-8.4	<2	.28	--	--
				14-60	GRV-S, GR-SL, LCOS	7.4-8.4	<4	.10	--	--
		Saguache	Loamy/sandy	0-6	SL, COSL, GR-SL	6.6-9.0	<2	.15	5	Low
				6-60	GRV-S, COS, GRV-LS	6.6-9.0	<2	.05	--	--
126	1-6%	Kandaly	Sands	0-1	LFS, LS	7.4-8.4	<2	.32	2	Moderate
				1-60	FS, LS	7.4-8.4	<2	.28	--	--
		Boltus	Shale	0-11	C, CL	7.9-9.0	8-16	.32	4	Moderate
				11+	Shale	--	--	--	--	--
127	0-3%	Vermillion Variant	Shallow loamy	0-3	L	6.6-8.4	<2	.37	4L	Low
				3-8	CN-L, CN-CL	7.4-8.4	<4	.15	--	--
				8-27	FLX-L, FLV-CL, FLV-L	7.9-8.4	<4	.10	--	--
				27+	Hard mudstone	--	--	--	--	--
		Seedskadee	Shallow loamy	0-14	SCL, L, SL	7.0-8.5	<2	.24	3	Low
				14+	Hard sandstone	--	--	--	--	--
		Fraddle	Loamy	0-4	SL	6.6-7.8	<2	.24	3	Low
				4-22	SCL	6.6-7.8	<2	.28	--	--
				22-34	SL, SCL	7.4-8.4	2-4	.28	--	--
				34+	Soft sandstone	--	--	--	--	--

Table A-7.5 (Continued)

Map Unit No.	Slope	Map Unit Component	Range Site	Depth (inches)	Texture[2]	Reaction pH	Salinity (mmhos /cm)	Erosion Factors[3] K (Water)	Erosion Factors[3] WEG (Wind)	Erosion Hazard
128	0-3%	Fraddle	Loamy	0-4	SL	6.6-7.8	<2	.24	3	Low
				4-22	SCL	6.6-7.8	<2	.28	--	--
				22-34	SL, SCL	7.4-8.4	2-4	.28	--	--
				34+	Soft sandstone	--	--	--	--	--
		Ouard	Shallow loamy	0-1	SL, SCL	6.6-7.8	<2	.24	3	Low
				1-19	SCL	6.6-7.8	<4	.28	--	--
				19+	Shale-sandstone	--	--	--	--	--
		San Arcacio Variant	Loamy	0-4	SL	6.6-8.4	<8	.24	3	Low
				4-14	SCL, SL	6.1-8.4	<2	.28	--	--
				14-25	LCOS, COS, GRV-S	6.6-8.4	<4	.10	--	--
				25+	Soft sandstone	--	--	--	--	--

[1] Adapted from ERO Resources Corporation (1988).

[2] U.S. Department of Agriculture Texture.

S	Sand	L	Loam	CL	Clay loam
FS	Fine sand	VFSL	Very fine sandy loam	SICL	Silty clay loam
COS	Coarse sand	FSL	Fine sandy loam	FSCL	Fine sandy clay loam
LFS	Loamy fine sand	SL	Sandy loam	SCL	Sandy clay loam
LS	Loamy sand	COSL	Coarse sandy loam	C	Clay
LCOS	Loamy coarse sand	SIL	Silt loam	SIC	Silty clay

Texture Modifier:

CN	Channery	GR	Gravelly
FLV	Very flaggy	GRV	Very gravelly
FLX	Extremely flaggy	SR	Stratified

[3] K = water erosion factor; WEG = Wind Erodibility Group.

Table A-7.6 Use Ratings and Limitations for J2PA Soils.[1]

Soil Series	Roadfill	Pond Reservoir Areas[2]	Shallow Excavations[2]	Bedrock Depth (inches)	Bedrock Hardness	Hydrologic Group	Limitations	Comments
Baston	Poor-area reclaim, low strength, shrink-swell	Mod-depth to rock	Mod-depth to rock, too clayey	20-40	Soft	D	High pH, low strength, shrink-swell, depth to rock.	
Boltus	Poor-thin layer, area reclaim, low strength, slope	1-8%: Sev-depth to rock. >8%: Sev-slope	Sev-too clayey	4-20	Soft	D	Shrink-swell, high pH, depth to rock, salinity.	
Chrisman	Poor-low strength	Slight	Sev-too clayey	>60	N/A	D	Shrink-swell, high pH, low strength.	
Clowers	Good	Mod-seepage	Slight	>60	N/A	C	High pH, salinity, low strength.	
Dines	Poor-low strength	Slight	Slight	>60	N/A	B	Shrink-swell, salinity, low strength	
Fraddle	Poor-thin layer	Mod-slope, depth to rock, seepage	Mod-depth to rock	20-40	Soft	B	Shrink-swell, depth to rock, low strength.	
Garsid	Poor-thin layer, area reclaim, slope	Mod-slope, depth to rock, seepage	1-15%: Mod-slope >15%: Sev-slope	20-40	Soft	C	High pH, depth to rock, low strength.	
Haterton	Poor-depth to rock, slope	1-8%: Sev-depth to rock. >8%: Sev-slope	Sev-depth to rock, slope >15%	10-20	Soft	D	High pH, depth to rock	
Horsley	Poor-depth to rock, slope	Sev-depth to rock, slope	Sev-depth to rock, slope	3-10	Soft	D	Shrink-swell, high pH, depth to rock, low strength.	
Huguston	Poor-depth to rock, slope	1-8%: Sev-depth to rock. >8%: Sev-slope	0-15%: Mod-depth to rock >15%: Sev-slope	4-20	Soft	D	Depth to rock,	
Kandaly	Good	2-8%: Sev-seepage >8%: Sev-slope	Sev-too sandy, cutbanks cave	>60	N/A	A	Too sandy.	
Langspring	Good	1-3%: slight 3-8%: Mod-slope >8%: Sev-slope	Slight	>40	Soft, rippable	B	High pH, stones, low strength.	
Langspring Variant	Good	1-3%: slight 3-8%: Mod-slope >8%: Sev-slope	Mod-depth to rock	20-40	Soft, rippable	B	High pH, depth to rock, excess lime, low strength.	

Table A-7.6 (Continued)

Soil Series	Roadfill	Pond Reservoir Areas[2]	Shallow Excavations[2]	Bedrock Depth (inches)	Bedrock Hardness	Hydrologic Group	Limitations	Comments
Leckman	Good	Mod-seepage	Mod-sandy	>60	N/A	B	High pH, too sandy, stones, low strength.	
Monte	Good	Slight	Slight	>60	N/A	B	High pH, low strength.	Good source for topsoil
Ouard	Poor-thin layer	Sev-depth to rock	Mod-depth to rock	10-20	Soft	D	High pH, depth to rock, low strength.	
Ouard Variant	Poor-thin layer, low strength, area reclaim	Sev-depth to rock	Mod-depth to rock	10-20	Soft	D	Shrink-swell, high pH, depth to rock, too clayey, low strength.	
Quealman	Good	Mod-seepage	Mod-sandy	>60	N/A	B	High pH, too sandy, stones, low strength.	
Saguache	Good	Sev-seepage	Sev-too sandy	>60	N/A	B	High pH, stones, low strength.	Gravel source
San Arcacio	Good	Sev-seepage	Sev-too sandy	>60	N/A	C	Shrink-swell, stones	Gravel source
San Arcacio Variant	Good	Sev-seepage	Mod-depth to rock, sandy	20-40	Soft	C	Shrink-swell, depth to rock, stones.	Gravel source
Seedskadee	Poor-thin layer	Sev-slope, depth to rock, seepage	Mod-depth to rock	10-20	Rippable	C	Depth to rock, stones	
Spool Variant	Poor-area reclaim, depth to rock, slope	4-8%: Sev-depth to rock >8%: Sev-slope	Sev-depth to rock, slope	3-20	Soft	C	Depth to rock, too sandy, stones.	
Tasselman	Poor-thin layer, area reclaim, slope	Sev-slope, depth to rock	Sev-depth to rock, slope	5-20	Hard	D	High pH, depth to rock	
Terada	1-15%: Good; 15%: Fair-slope	1-8%: Mod-seepage; slope; >8%: Mod-slope	1-8%: Slight 8-15%: Mod-slope	20-40	Soft	B	High pH, depth to rock, low strength.	Good source for topsoil in areas where slopes are 1-8%
Tresano	Good	1-3%: Mod-seepage; 3-8%: Mod-slope	Slight	>40	Soft	B	Shrink-swell, high pH, low strength.	Good source for topsoil.
Vermillion Variant	Poor-depth to rock	Mod-depth to rock	Mod-depth to rock, stones	20-40	Rippable	C	Depth to rock, stones, excess lime.	

[1] Adapted from ERO Resources Corporation (1988).
[2] Mod = moderate; Sev = severe.

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A-8.0 ROAD SPECIFICATIONS, PLANS, AND MAINTENANCE

A-8.1 GENERAL REQUIREMENTS

In general, all roads to be built, improved, or rebuilt within the TPA would be developed according to the standards stated below for designed roads. Roads on state or private land within the area would be planned and built according to these same standards unless otherwise specified by private landowners. Where roads are not developed in accordance with BLM standards, the potential for adverse impacts to health and safety and sensitive environmental resources is increased.

Newly designed roads on federal lands or these requiring a federal undertaking would comply with the requirements of the BLM District Engineer. The District Engineer requirements draw on the BLM Manual Section 9113 - Roads (BLM 1985) and the associated Wyoming State Supplement (BLM 1991a), as well as other BLM Manual Sections. Design elements of the roads also would draw on the current American Association of State Highway and Transportation Officials (AASHTO), Manual on Uniform Traffic Control Devices (U.S. Department of Transportation Federal Highway Administration 1988), American Society for Testing Materials, and Wyoming State, and Sublette County design criteria, where appropriate.

In March of 1992, the Wyoming BLM adopted the *Wyoming State Supplement to the BLM Manual 9113* (BLM 1991a). This supplement amplifies several parts of the BLM Section 9113 (BLM 1985). Some of the information contained within this document is emphasized below:

> *In Wyoming, Bureau roads are designed, constructed, and/or upgraded for long-term use and are to be located, designed, and constructed to provide safety to the user and require the minimum amount of maintenance. Adequate design and construction of drainage structures, cut and fill slopes, and the travel-way will minimize future maintenance needs. The Bureau will not accept roads constructed by others which require excessive maintenance expenditures by the Bureau.*

> *A standard below the Resource Road classification may only be constructed for short duration use (30-60 days) and should not service traffic during the winter and spring months.*

> *In most cases, flat-bladed roads develop into canals and are a hazard to the user as well as creating environmental problems. Flat-bladed roads will not be authorized in Wyoming. The exception to this rule will be for the lowest class resource road where upgrading of short segments of an existing route is planned, i.e., excavating a hump for better site distance, widening a curve, etc.*

Where information in the BLM Manual dealing with roads and bridges seems inappropriate or hard to understand, the Rock Springs BLM District Engineer would be consulted for clarification.

The following standards are the minimum standards for all roads constructed on BLM lands in Wyoming. The standards are found within BLM (1985). These standards are values established to ensure adequate uniformity and quality of all roads constructed on lands administered by the BLM. Average daily traffic, vehicle types, and design speed determine the geometric standards to be applied.

A-8.2 TECHNICAL REQUIREMENTS FOR ROADS

Additional requirements for roads within the TPA are discussed below. Because each road is unique, it is not the purpose of this document to give all of the technical data that may be necessary for every road. Each road construction project would be evaluated with its own requirements and appropriate technical information obtained during the annual transportation planning processes and subsequently processed APDs and ROW applications.

BLM Manual Section 9113 (BLM 1985) and its Wyoming State Supplement (BLM 1991a) contain the comprehensive technical requirements necessary for the design of roads on Wyoming BLM administrated lands. A copy of applicable BLM Manual Sections can be obtained from the BLM Rock Springs District Office.

A-8.3 ROAD SURFACE MATERIAL

At this time, known road-surfacing material sources available for roads in the TPA are limited to three locations--two sand pits and one gravel quarry. Potential surface material sources on and adjacent to the area are shown on the maps available for review at area BLM offices. The need for additional surface aggregate sources is not anticipated for this project. If additional source locations are deemed necessary, they would be identified during the annual transportation planning process.

Many roads within the TPA are or would be built across sandy or clayey soils and would require surfacing material. Both sandy and clayey soils are subject to unique stability problems (see Section A-7.2), which can be remedied with the application of an aggregate surface. When surfacing aggregate is required for roads in the TPA, it would consist of appropriate material and gradations. Surface material would be applied to the minimum compacted depths that meet current BLM standards.

A-8.4 DRAINAGE CROSSINGS

Bridge, culvert, and low water crossing designs would conform to the BLM Manual Section 9112 (BLM 1990a), Wyoming State law, and standard engineering practices. Drainage structures can be placed on most of the drainages within the TPA using a U.S. Army Corps of Engineers (COE), Nationwide 404 Permit 14 (Road Crossings Sections 10 and 404). The COE would be consulted to obtain permits for crossing drainages, and it is anticipated that nationwide permit stipulations would be met under most circumstances. If the stipulations in Permit 14 cannot be met, a full standard 404 Permit would be required. The COE would be notified when construction of a road involves a drainage, even if all provisions of Permit 14 are met or flow in the drainage is intermittent. Usually a simple letter to and a reply from the COE would satisfy the requirement on small drainages. If there is any question about the need to obtain a COE permit or the type of permit necessary, contact with the Wyoming COE would be initiated (Wyoming Regulatory Office, U.S. Army Corps of Engineers, 2232 Dell Range, Suite #210, Cheyenne, WY, 82009, [307] 772-2300).

Culverts, bridges, or low water crossings would be installed wherever a road is constructed across a defined drainage or natural channel. Culverts would be designed to pass no less than a 10-year flood without developing static head at the entrance, as identified by a BLM hydrologist, engineer, or other similarly qualified individual. Calculations would be based on local soil types and other pertinent environmental data. The size and gradient of the culvert would be designed to avoid damage from a 25-year flood. Culverts smaller than 18 inches in diameter would not be used due to problems with cleaning and maintenance.

In addition to installing culverts in defined drainages to provide adequate cross drainage and to minimize erosion, cross culverts would be installed at appropriate spacings for lateral drainage. There are three major factors to consider when determining culvert spacing--gradient, soil type, and rainfall intensity. Other factors that effect drainage are frost and frozen ground, snow depth, groundwater depth, soil permeability, and evaporation rate. Recommended spacing of cross culverts for various gradients and soil types are given in the BLM Manual Section 9113 (BLM 1985). This is a good guide for most situations and would be used unless local experience dictates otherwise.

In some relatively flat areas with permeable, well-drained soils, a culvert may fill with sand and silt annually, providing no drainage. Culverts in areas with highly erosive soils have a tendency to wash out, leaving an impassable barrier. When past experience or soil and gradient conditions indicate potential problems with culverts, the best option may be to construct the road without cross drain culverts except on defined drainages and evaluate the drainage performance of the road and adjacent area. Raised roads with flat-bottomed ditches may be useful in poorly drained areas. If unacceptable amounts of water accumulate and do not dissipate within a reasonable period of time, corrective action would be taken. Such action may include installing a dip or low water crossing, or installing a culvert and evaluating its performance.

A-8.4.1 Culverts

Culverts are to be aligned with the natural drainage, and would comply with BLM Manual, Sections 9112 (1990a) and 9113 (1985) and the Wyoming State Supplement (1991a). Culverts would be installed as needed at all road intersections except when an

intersection occurs at the crest of a ridge. The minimum allowable culvert diameter is 18 inches. Culverts and structures would be strong enough to support a minimum of HS-20 loading (AASHTO specification) as required by BLM (1985).

A-8.4.2 Low Water Crossings

Low water crossings may be used with BLM approval, when necessary, as a type of drainage crossing where a 10-year runoff design produces more runoff than can be reasonably handled with a drainage structure or when the cost of a structure is unreasonable. Cost analysis, terrain and drainage features, structure stability, and necessary drainage diversions must be considered when determining the best alternative for crossing a drainage.

Environmental disturbance also must be considered. Drainage structures may not be the best environmental choice. Low water crossings, if constructed properly, may cause less short- and long-term environmental damage than a large structure with road approach fills, water backup, and downstream bed scouring. Low water crossings require continued maintenance to minimize erosion and allow vehicles to cross. Low water crossings should not be considered when there is a fishery or a water flow for more than just runoff periods. Low water crossings in drainages with flow tend to become impassable during winter months due to the freeze and thaw cycles. Trucks attempting to cross ice crusts over water may break through and may high-center on the ice.

A-8.4.3 Bridges or Structures

Bridges and major culverts constructed on public lands must conform to BLM standards as outlined in Bureau Manual Section 9112 (BLM 1990a), including design by or under the direction of a qualified registered professional engineer. These structures are unique and would be developed site specifically. Some structures, such as bridges, may need to be designed to carry heavier loads and would be considered individually at the time of construction. All bridges must have a minimum curb-to-curb or rail-to-rail width (whichever is less) of 14 ft for single lane roads and 24 ft for double-lane roads, but in all cases, not less than the nominal width of the adjacent travelway as measured at right angles to the travelway centerline. All structures would be designed for a minimum of a HS-20 loading.

A-8.5 ROAD LAYOUT AND CONSTRUCTION INSPECTION

Surveying and staking necessary for road construction or improvement would be done by or under the direction of proper Wyoming registered professionals (e.g., surveyors, engineers). The complexity of the project would govern the amount of work, design, and inspection necessary.

A-8.5.1 Centerline Staking

Surveyors have many methods used to lay out roads. At a minimum, the BLM requires that stakes be placed on the centerline of the road at a maximum distance of 100 ft; at all fence or utility crossings, and at all abrupt breaks in ground profile of vertical change of 1 ft or more. Stakes would be placed on the centerline of the road at a maximum distance of 50 ft around curves of 4° or sharper. The station or stake number would be written clearly on each stake. Section corner ties would be made and shown on all road design plans, as presented in applications. The BLM may require additional construction staking criteria as determined on an individual basis.

A-8.5.2 Construction Monitoring

Many access roads can be constructed without major inspection efforts. Roads without unusual construction requirements may, in some cases, be monitored by Operators. The extent and type of construction monitoring would be determined by the BLM for roads across BLM land.

Construction inspection insures the following.

- The route approved for construction is followed with as little environmental disturbance as practical.
- All sensitive environmental, paleontological, or cultural/historic sites are adequately protected.
- Construction methods properly remove organic matter from roadfill areas or fill material.
- Topsoil removal, stockpiling, and replacement and, in some instances, reseeding are conducted commensurate with approved design.

- Embankments meet proper width, slope, and compaction criteria. This may involve the use of water.
- Frost in the ground is not so excessive that it precludes proper construction.
- Reasonable efforts are made to walk equipment on the overall road surface to help with compaction.
- Drainage structure installation includes adequate compaction, rip-rap placement, drainage bowl installation, cover depths, wing ditch slopes and lengths, etc.
- Proper sign placement is used.

In some cases, the inspector may be required to certify that the construction was completed according the design parameters and standards specified in ROW applications. In this case, a Wyoming registered professional would provide to the BLM and relevant Operators a seal and signature on an affidavit of completion, according to the approved plans and specifications.

A-8.6 OTHER DESIGN GUIDELINES

The BLM Manual Section 9113 - Roads (BLM 1985) and its Wyoming Supplement (BLM 1991a), as well as other applicable manual sections would be the guides for design elements such as horizontal and vertical alignment, curve super elevation, cross section elements, earthwork design, drainage elements, cattle guards, sign and markers, sight distances, and staking.

The roadway structure which includes the subgrade, the sub-base course (in some cases), and the base course, or the base course used as a surface course, in the case of graded earth roads, must be strong enough to support HS-20 loadings (AASHTO specification) as required by BLM specifications or by engineer design, where design exceeds BLM minimum requirements.

The unique qualities of the particular road and its location govern how the structure is designed and built. In general, road surfacing varies in thickness according to various design factors.

All cattle guards or other structures are to have a minimum curb-to-curb or rail-to-rail width (whichever is less) of 14 ft for single lane roads and 24 ft for double-lane roads, but in all cases, not less than the nominal width of the adjacent travelway as measured at right angles to the travelway centerline. All structures would be designed for a minimum of a HS-20 loading.

A-8.7 MAINTENANCE

All roads on the project area would be maintained to BLM 9113 Manual specifications (BLM 1985, 1991a). Maintenance on collector roads is anticipated to occur at least twice per year, whereas local and resource road maintenance may be required only once annually. All roads required for the proposed project would be maintained as necessary to provide all-weather access (e.g., grading, surface material application, snow plowing), and Operators would be responsible for these maintenance actions. Maintenance agreements developed among Operators would be provided to the BLM (see Section A-9.1). Where roads become impassable, the BLM may deny access until the roads are repaired and/or the potential for resource damage is otherwise alleviated.

A-9.0 MAINTENANCE AGREEMENTS

Maintenance agreements are usually binding contracts between companies which deal with road maintenance. The BLM generally does not enter into maintenance agreements with companies. The preferred approach is for companies to work together and adjudicate maintenance agreements amongst themselves. Operators would provide the BLM with copies of all road maintenance agreements, including the name of a designated contact person. Non-oil and gas roads would be maintained by the BLM or other ROW holder.

Problems may occur with new companies in the area. Maintenance agreements must be revised to include the new user. If a company is the first to drill in an area, that company may be the sole road maintainer until other companies begin to access the area. Agreements would be reviewed and budgets for maintenance prepared yearly in association with the annual transportation planning process. Maintenance meetings would be held with all participants to review all road maintenance agreements. If a company only has a few roads, review may be made over the phone with other participants and then the contract can be mailed and notarized signatures obtained. When Operators or other area users propose new activity that would utilize part or all of an existing road, maintenance agreements for existing roads must be restructured to include the new users.

Maintenance agreements would contain grading and other maintenance schedules, participant responsibilities, and cost allocation. Agreements would describe response methods and primary and secondary emergency contacts for hazard maintenance.

Operator responsibilities for road maintenance can be divided into at least three types of agreements. The principle maintenance agreement type weights the maintenance cost share of each Operator according to the amount of projected use of the road. The projected use can be based on past use, number of producing wells and facilities down-road, and wet weather access needs. The maintenance contract would have each Operator's tallied amounts and commitments for the upcoming year. This agreement type would be the most commonly used on the J2PA. Other types of agreements involve Operators taking care of road maintenance on alternate time intervals or dividing a road into segments of near equal maintenance amounts and assigning each Operator maintenance responsibility for their segment of the road.

Snow removal often is considered as a separate item. Some Operators may not need access to sites during the winter months and may not participate in costs associated with snow removal. In some cases, roads may only need maintenance once or twice per year or at some other time interval.

A-10.0 LITERATURE CITED AND ABBREVIATIONS

A-10.1 LITERATURE CITED

Bureau of Land Management. 1985. Manual 9113-Roads. Engineering Rel. 9-247. U.S. Department of the Interior, Bureau of Land Management.

_____. 1990a. Bureau of Land Management Manual Section 9112.

_____. 1991a. Wyoming Supplement to the Bureau 9113 Manual. U.S. Department of the Interior, Bureau of Land Management, Wyoming State Office. 16 pp.

ERO Resources Corporation. 1988. Burma Road soil survey. Prepared for the U.S. Department of Interior, Bureau of Land Management, Pinedale Resource Area, Rock Springs District, by ERO Resources Corporation, Golden, Colorado. February 1988. 157 pp. + append.

Soil Survey Staff. 1983. National Soils Handbook and updates. U.S. Department of Agriculture (430-VI-NSH), Washington, D.C.

U.S. Department of Transportation Federal Highway Administration. 1988. Manual on Uniform Traffic Control Devices.

A-10.2 ABBREVIATIONS

AASHTO	American Association of State Highway and Transportation Officials
APD	Application for Permit to Drill
BLM	U.S. Bureau of Land Management
COE	U.S. Army Corps of Engineers
EIS	Environmental Impact Statement
GIS	Geographic Information System
HS-20	Refers to the AASHTO truck type and axle load rating
J2PA	Jonah Field II Project Area
Operators	McMurry Oil Company, Snyder Oil Corporation, Amoco Production Company, Western Gas Resources, and other companies
ORV	Off-road vehicle
POD	Plan of Development
PRA	Pinedale Resource Area
ROW	Right-of-way
TPA	Transportation planning area
WDOT	Wyoming Department of Transportation

ADDENDUM A-A:

ACCESS PERMITS

ACCESS PERMITS

Whenever a proposed road is to access an existing state or county road, an access permit must be obtained prior to construction. When a pipeline or other utility will cross a state or county road, a license or permit is required. In general an application for an access permit includes the application form, fee, and plans and specifications. The plans and specifications shall show the location of the proposed construction with reference to a mile mark (state roads), the nearest city, or a well-defined point. The plans and specifications also include approach radius, roadway width, drainage structures, signing, profile and grades, surface material, and any other information required by the state or county with jurisdiction of the road. If the proposed access is on private land, a copy of the lease agreement with the private landowner and power of attorney to apply for access also should be submitted. The location of the proposed access should be flagged and marked so the state or county official considering the application can identify it for inspection. The official inspecting the location would approve or reject the application based on sight distance, proximity to other approaches or structures, and other factors. The Wyoming Department of Transportation, Sublette County Engineering Department should be consulted for current application forms, fees and design criteria for the proposed access.

Current information and fee rates may be obtained from:

Wyoming Department of Transportation
Rock Springs District Office
P.O. Box 1260
Rock Springs, Wyoming 82902
(307) 352-3000

Sublette County Planning and Zoning
21 South Tyler
Pinedale, Wyoming 82941
(307) 367-4375

Where roads cross another ROW such as a pipeline or other utility, the owner of the ROW must be contacted for requirements for constructing a crossing over the pipeline or utility ROW. The owner also should be given advance notice of construction to allow the owner or a representative to be present for inspection during construction.

The remaining pages in Addendum A contain sample Sublette County and Wyoming Department of Transportation access permit application forms.

SAMPLE
SUBLETTE COUNTY ACCESS PERMIT

APPLICATION FOR ACCESS DRIVEWAY ONTO COUNTY ROAD
SUBLETTE COUNTY, WYOMING

Date: _____ Permit No.: _____

Name: _____

Address: _____

Telephone: (home) _____ (office) _____

Application is hereby made to the Board of County Commissioners, Sublette County, Wyoming for a permit for access to a county road on property whose legal description is:

County road involved: _____

Type of access: (Circle one) Private, Commercial, Industrial, Subdivision, Other (explain).

Size and type of culvert to be used: _____

_____

Width of approach: _____

Submit a diagram showing the relation of access to property lines, county road, and any other roads within 1/4 mile

Access must meet all requirements as set forth in the Road Standards of Sublette County.

I, _____, say that I am the owner of the property involved in this application. The foregoing statements and answers, and those in the attached plans and other exhibits, are true and correct to the best of my knowledge and belief.

Signed_____

Witness:

_____

The foregoing application was _____approved _____denied on this _____ day of _____, 19____.

_____

Road and Bridge Foreman

SAMPLE
ACCESS PERMIT FORMS
FOR ALL AGENCIES

FORM H3

WYOMING DEPARTMENT OF TRANSPORTATION
ACCESS PERMIT

DATE OF APPLICATION _____

The Undersigned hereby makes application for permission to construct an access driveway (s) described below and as shown on the attached sketch or plan "hereby made part of this application" to:

TO BE FILLED OUT BY THE PROPERTY OWNER

LOCATION OF PROPERTY:

HIGHWAY NO. _____ COUNTY _____ APPROXIMATELY _____

MILES _____ FROM _____
N.S.E.W.

FOR INGRESS OR EGRESS TO A _____
RESIDENCE OR BUSINESS AND TYPE

ACCESS DRIVE, ON _____ SIDE OF HIGHWAY, PROPOSED DRIVEWAY.
N.S.E.W.

AGREEMENT:

I, the Undersigned property owner, request permission to construct an access driveway (s) on public right-of-way at the above location, subject to the restrictions and regulations contained in the "RULES AND REGULATIONS FOR ACCESS DRIVEWAY (S) to WYOMING STATE HIGHWAYS" current edition. In consideration of these regulations, the applicant agrees:

1) To construct driveway(s) in a safe manner so as not to interfere with or endanger public travel and to perform all work in a neat and workmanlike manner, to use materials acceptable to the Department of Transportation and to leave the right-of-way clean and in a condition equal to or better than the original condition.

2) To fully protect the traffic on the highway during construction covered hereunder by proper barricades, flagman, and/or signs as shown in the Traffic Control for Roadway Work manual, and to hold harmless the Wyoming Department of Transportation, its officers and employees from all dangers, expenses, claims or liability arising out of any alleged damages of any nature to any person or property, due to the construction performance or nonperformance of work, or existence of said driveway.

3) That no driveway(s) shall be constructed such that there will be parking or servicing of vehicles within the highway right-of-way.

4) That the profile grade of driveway(s) shall be constructed as indicated on the attached sketch or plan and shall in no case be graded or maintained such that water will drain onto the highway surface.

5) That this permit becomes VOID if construction is not completed within _____ days after the initiation of construction or one year after the date of approval if no construction has been done.

6) That any change in land use which would generate greater traffic volumes would nullify this agreement for access and a new application must be submitted.

7) That the Wyoming Department of Transportation reserves the right to inspect these installations at the time of construction and at all times thereafter until accepted by the Department, and to make changes at any time necessary to provide protection of life and property on or adjacent to the highway. Once an approach/access has been accepted by the Department it becomes the Department's to maintain and repair except for snow or debris removal.

8) To any additional requirements as sent forth under DISTRICT ENGINEERING REQUIREMENTS/COMMENTS on reverse side, and/or any on the sketch or plans.

APPLICANT _____ ADDRESS _____
(PRINT)

FIRM NAME _____ CITY _____ STATE ____ ZIP _____

PHONE NUMBER (____) _____ SIGNATURE _____

Revised: June 1993 10-11

FORM H3

DESCRIPTION FOR WYOMING DEPARTMENT OF TRANSPORTATION USE ONLY

ROAD SECTION _____, MILEPOST _____,

ROADWAY CLASSIFICATION _____, RIGHT OR LEFT STATION _____,

PROJECT _____, SECTION _____,

TOWNSHIP _____, RANGE _____,

_____ FT, AND _____ FT, SURFACE TYPE _____,
WIDTH RADIUS

DRAINAGE STRUCTURE REQUIRED YES/NO, LENGTH _____, TYPE/SIZE _____,

SLOPE _____ AND OR VALLEY GUTTER TO BE LOCATED _____ FEET FROM THE SHOULDER LINE.

RIGHT OF WAY FROM CENTERLINE OF HIGHWAY _____ FEET.

RIGHT-OF-WAY-DIVISION PERMIT NO. _____

ACCESS CONTROL: FULL _____ LIMITED _____

NONE _____ NONE ASSUMED _____

SIGNATURE _____ TITLE _____ DATE _____

DISTRICT ENGINEERING:

PRELIMINARY FIELD INSPECTION BY _____ DATE _____
(INCLUDE TITLE)

REQUIREMENTS/COMMENTS:

SIGNATURE _____ TITLE _____ DATE _____

APPROVAL FOR CONSTRUCTION:

THE ABOVE APPROACH PERMIT IS GRANTED, WITH THE CONDITIONS STATED HEREIN THE ____ DAY OF _____, A D 19 __

WYOMING DEPARTMENT OF TRANSPORTATION BY: _____
DISTRICT ENGINEER/DISTRICT TRAFFIC ENGINEER

CONSTRUCTION INSPECTION:

I HAVE INSPECTED THE ACCESS DRIVEWAY(S) AND HAVE FOUND THE ACCESS(ES) TO BE CONSTRUCTED AS PER THE REQUIREMENTS ON THIS APPLICATION.

SIGNATURE _____ TITLE _____ DATE _____

ACCESS ACCEPTANCE:

DISTRICT PERSONNEL HAVE INSPECTED THE ACCESS DRIVEWAY(S) DESCRIBED ON THIS APPLICATION AND ATTACHED DRAWING(S) AND HAVE FOUND THE ACCESS DRIVEWAY(S) TO BE CONSTRUCTED IN THE MANNER AS PRESCRIBED ON THIS APPLICATION AND ATTACHED DRAWING(S).

_____ _____
DISTRICT ENGINEER/DISTRICT TRAFFIC ENGINEER DATE

REFERENCES: OPERATING POLICY 21-1/RULES & REGULATIONS FOR ACCESS DRIVEWAYS TO WYOMING STATE HIGHWAYS

Revised: June 1993 10-12

APPENDIX B:

RECLAMATION PLAN

RECLAMATION PLAN
FOR THE JONAH II FIELD
NATURAL GAS DEVELOPMENT PROJECT

Prepared for

Pinedale Resource Area
and
Green River Resource Area
Rock Springs District
Bureau of Land Management
Rock Springs, Wyoming

By

TRC Mariah Associates Inc.
Laramie, Wyoming
MAI Project 11434

April 1998

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B.1.0 RECLAMATION OBJECTIVES

This reclamation plan would be used by the Operators of the Jonah II Field Natural Gas Development Project as guidance to achieve successful reclamation on federal lands within the Jonah Field II Project Area (J2PA). Alternate reclamation procedures may be implemented on private and state lands. The plan complies with Bureau of Land Management (BLM) reclamation policy (BLM 1990c) and management directives specified in the Pinedale Resource Area Management Plan (BLM 1987a, 1987b). The reclamation plan was developed based on these policies and directives, Executive Order 11987, and impacts and scoping issues identified in the Jonah Field II environmental impact statement (EIS). The procedures presented in this plan are designed to allow flexibility based on specific conditions encountered at each proposed disturbance site. Site-specific reclamation procedures would be developed in each Application for Permit to Drill (APD), Right-of-way (ROW) application, or Sundry Notice and submitted to the BLM for review and approval prior to the authorization of surface-disturbing activities.

Short-term reclamation goals would be the immediate stabilization of disturbed areas and the protection of adjacent undisturbed areas from unnecessary degradation. The long-term reclamation objective would be to restore all disturbed lands to allow for the reestablishment of self-sustaining native vegetation. Other goals include the protection of surface water and groundwater resources through the reconstruction of a geologically and hydrologically stable landform that would support future land uses (i.e., wildlife habitat, recreation, livestock grazing, and mineral exploration).

BLM-required reclamation objectives are:

- the isolation and/or removal of all undesirable materials (e.g., poor quality subsoils, contaminated soils, potentially hazardous materials) to protect the reclaimed landscape from contamination;
- recontouring and implementation of other soil conservation, surface manipulation, and water management techniques to establish stable slopes, water courses, and drainage features to minimize erosion and sedimentation;
- revegetation of reclaimed areas to stabilize soils and establish a self-perpetuating native plant community capable of supporting post-disturbance land uses;
- establishment of acceptable long-term visual aesthetics by minimizing visual contrasts; and
- monitoring and management of reclamation sites by Operators to evaluate and encourage continued reclamation success (BLM 1990c).

The reclamation process has been divided into four major phases: predisturbance planning and site preparation, interim reclamation, permanent reclamation, and reclamation success monitoring. By minimizing the amount of land disturbed through predisturbance planning and initially preparing the site for construction activities with the understanding that the area would eventually be reclaimed (e.g., top soil stripping and stockpiling for later use during site reconstruction, keeping facilities away from cut-and-fill slopes and in as small an area as possible), the acreage requiring disturbance would be reduced and reclamation success would be facilitated.

Interim reclamation involves the reconstruction of areas during the planned development but not necessarily disturbed for the life-of-project (LOP) (production reclamation), as well as stabilization of disturbed areas to control runoff and erosion until permanent reclamation procedures are applied (temporary reclamation). Construction-related disturbance areas along road ROWs and topsoil stockpiles are examples of interim reclamation sites.

Permanent reclamation includes the reconstruction of locations no longer needed for the project. A nonproducing well location and associated access road are examples of permanent reclamation sites. Upon project completion, all disturbed areas except roads to be retained for other land uses would be reclaimed permanently as designated by the BLM or other landowner.

Reclamation success monitoring involves assessing the status of reclaimed areas to ensure they meet desired site stability and productivity standards.

B.2.0 AFFECTED COMMUNITIES

As described in Section 3.3.1 of this EIS, the J2PA is dominated by the Wyoming big sagebrush/grassland vegetation type. Saltbush and cushion plant communities also are present to a limited extent, primarily in the eastern portions of the J2PA.

Less than <1% of the J2PA is considered potential wetland. Potential wetlands occur primarily as inclusions within the dominant vegetation types and consist of ephemeral stream channels with ponds and reservoirs/impoundments adjacent to these channels. One additional potential wetland occurs as a 25-acre playa. Stabilized sand dunes also occur sporadically throughout the southern portions of the J2PA and occupy <1% of the area (see Section 3.2.3 and Map 3.1 in the EIS). No active dunes are known to occur.

Reclamation potential within the sagebrush, grassland, and potential wetland communities would be good to excellent; however, in the saltbush, cushion plant, and playa communities, reclamation would be limited by shallow soils, droughtiness, salinity, and other adverse soil characteristics. Sandy soils associated with stabilized dunes are very susceptible to wind erosion when vegetation cover is removed, and the reclamation of these areas following disturbance may pose the greatest challenge on the J2PA. Reclamation potential also may be limited by other extant conditions on the J2PA, including salinity, alkalinity, steep slopes, noncohesive soils, weather conditions (high winds, drought), periodic flooding, short growing seasons, and livestock and wildlife use.

B.3.0 PREDISTURBANCE PLANNING AND SITE PREPARATION

During selection of drill site, road, pipeline, and ancillary facility locations, consideration of future reclamation needs would facilitate land reclamation by minimizing the amount of land disturbed and avoiding, where practical , areas where reclamation potential is low. These avoidance areas include:

- areas with high erosion potential (e.g., rugged topography, steep slopes [>25%], stabilized sand dunes, floodplains);
- areas with saturated soils;
- wetland/riparian areas (e.g., perennial stream channels and open water areas) and a 500-ft buffer; and
- ephemeral and intermittent channels and a 100-ft buffer.

Prior to disturbance, Operators and the BLM would conduct on-site inspections of each proposed disturbance site to determine the suitability of proposed facility locations and/or alignments, and to develop a site-specific reclamation plan. In addition, Operators would submit for BLM approval Surface Use Plans and/or Plans of Development (PODs) for each proposed surface disturbance site. These plans would contain site-specific erosion control, revegetation, restoration, and monitoring procedures, and would provide information on the following:

- project administration, time frames, and responsible parties;
- reclamation objectives;
- topsoil removal, storage, and handling criteria;
- runoff, erosion, and sedimentation control procedures;
- seedbed preparation and seeding application procedures; and
- fertilization, mulching, and/or other site protection requirements (i.e., small-scale fencing and weed, livestock, and herbivore control).

Stormwater pollution prevention plans would be prepared for all project activities requiring greater than 5 acres of disturbance to ensure that precipitation would not cause erosion or sedimentation problems. These plans may be prepared for groups of wells, where multiple well, road, pipeline, and/or ancillary facility locations have been determined. A Notice of Intent would be submitted to the Wyoming Department of Environmental Quality for review, and a pollution prevention plan prepared and implemented. Copies of the pollution prevention plan and inspection reports would be retained on file in the Operators' offices.

B.3.1 TOPSOIL AND SUBSOIL HANDLING

Topsoil would be salvaged and stockpiled from all proposed disturbance areas unless the BLM deems that leaving topsoil in place (e.g., during pipeline construction) would better facilitate successful reclamation. Prior to BLM authorization of surface disturbance, the amount of topsoil or other suitable plant growth material to be removed and topsoil storage areas would be specified. If less than 6 inches of topsoil (i.e., soils with some organic matter content) are available, topsoils may be mixed with suitable subsoil materials for stockpiling so that a minimum of 6 inches of plant growth material is available for use during reclamation. Under no circumstances would subsoils that are unsuitable as a plant growth medium be mixed with topsoil materials. Decisions regarding the volume of topsoil removed and the need for mixing would be made on a site-specific basis during APD and ROW application processing. The need to strip topsoil for some project activities (e.g., along pipeline routes) also would be determined on a site-specific basis. Topsoil in excess of 6 inches, if available, may be stored for use in areas off-site that lack sufficient topsoil for reclamation. Whenever possible, topsoil would be used immediately. Topsoil stockpiled for more than 2 years would be protected from erosion by reducing piles to less than 3 ft in height and by seeding and possibly mulching (see Section B.4.0).

Topsoil stockpile areas would be marked in the field and noted on maps, and their surface area would be maximized to reduce adverse impacts to soil microorganisms. All surface vegetation stripped with topsoils would be incorporated directly into the topsoil to augment organic matter content and seed source availability, unless shrub materials are required to be handled separately. Runoff would be diverted around topsoil stockpiles to minimize erosional loss, and stockpiles would be located as close as possible to future reclamation sites.

Whenever possible, disturbance sites would be designed with a balance of cut and fill to minimize the

volume of subsoil stockpiled. When subsoil materials would be stockpiled, they would be isolated from topsoil stockpiles and located so as not to affect existing drainages. These stockpiles would be kept as small as possible and would be constructed to remain stable until they are used during reclamation. In addition, they would be located to minimize construction activity during recontouring.

In most instances, vegetation present at and surrounding proposed disturbance sites would provide sufficient information for determining reclamation seed mixes. Soil testing and reporting would be the responsibility of the Operators. Testing may include, but is not necessarily limited to pH; texture; salinity; alkalinity; nitrogen, phosphorus, and potassium levels; organic matter; and toxic elements (e.g., selenium).

Alternate site preparation procedures may be applied in some areas (i.e., dry alkaline sites, potential wetland areas) to facilitate reclamation; however, it is assumed that most, if not all, of these areas on the J2PA can be avoided. In dry alkaline areas (which generally occur at relatively flat sites associated with playas or broad drainages), there is often very little topsoil, and excavations may result in drainage problems. Vegetation and topsoil removal usually results in the need to import materials from off-site to build up required surfaces. Borrow material sources and quantities would be defined prior to construction.

In potential wetland areas, vegetation would be cut to ground level, leaving existing root systems intact. Grading activities would be limited to areas directly over pipeline trenches and road surface areas, and at least 12 inches of topsoil would be salvaged and replaced except in areas with standing water or saturated soils. Construction when the ground is frozen may be implemented as an alternative to minimize damage to wetland areas. Use of construction equipment would be limited, and if standing water or saturated soils are present, wide-track or balloon-tire construction equipment or normal construction equipment operated on equipment pads or geotextile fabric overlain with gravel fill may be used. Equipment pads would be removed immediately following completion of construction activities. Trench spoil would be placed at least 10 ft from drainage channel banks, and dirt, rockfill, and brush riprap would not be used to stabilize ROWs.

B.3.2 WELLPAD AND FACILITY SITE CONSTRUCTION

Prior to construction, proposed pad and facility site locations would be surveyed and staked, and the BLM would review all erosion control design considerations to determine their adequacy. Locations would be designed to parallel the contour with reserve pits on the uphill side of pads whenever possible. Wellpads would be designed and constructed to disturb the smallest area necessary to provide for efficient and safe operations.

All cut-and-fill slopes with greater than 3 ft cut and/or fill would be staked at least every 50 ft. Spoil storage areas would also be staked, and excess material would be incorporated into fill slopes or placed in designated areas and stabilized. Backsloping would be necessary only in areas of steep terrain (>10% slopes).

During construction, interceptor ditches would be installed above cuts and around reserve pits, as necessary. Collector ditches and sediment control structures designed for a 10-year/24-hr storm event may be required below fill areas. Flows of less than the 10-year/24-hr event would be diverted and/or collected before being discharged from the disturbed area. Qualified specialists would supervise the installation of all erosion control structures, including berms, dikes, and trenches.

B.3.3 ROADS

New roads generally would follow natural contours and would be constructed in accordance with BLM road standards (BLM 1985, 1991a). For roads on slopes of less than 15%, available topsoil would be stripped from the construction area and placed in windrows within the construction ROW by sidecasting with a grader. Where roads must be constructed on slopes greater than 15%, topsoil would be transported to more level terrain for storage. After road construction (first fall season during interim or permanent reclamation), topsoil would be replaced on road outslopes, and these areas would be reseeded (see Sections B.4.0 and B.5.0).

Surface runoff and control would be incorporated into all road designs in accordance with BLM standards (BLM 1985, 1991a), and would be approved by the BLM. Road grades, ditches, culverts, sediment traps,

material cuts and fills, and topsoil and spoil storage areas would be designed and located in the field prior to construction. Road culvert locations and spacings would be approved by the BLM prior to construction and would be in accordance with accepted engineering standards.

B.3.4 PIPELINES

When constructing and reclaiming pipelines, existing crowned-and-ditched roads would be used for access, where practical, to minimize surface disturbance. Pipeline trenches would not be placed in access road borrow ditches unless other reasonable locations were unavailable. Gathering pipelines may be installed on the surface in areas where slopes are greater than 25% and/or where rock outcrops are crossed; when possible, they would be built perpendicular to the contour to minimize the area required for construction.

Vegetation would be removed from pipeline ROWs so as to leave the root systems intact, and the removed vegetation would be spread over disturbed areas to provide protection, nutrient recycling, and a natural seed source. Pipeline trenches would be excavated with a backhoe to minimize disturbance.

Frozen soils, vegetation, and snow would not be used to backfill pipeline trenches. This action would reduce trench compaction needs. In no event would backfill berms in excess of 3 inches in height be placed over backfilled trenches.

Clean gravel would be used for the upper 1 ft of fill over backfilled pipeline trenches in perennial and intermittent streams. Silt fences or other sediment filtering devices would also be installed along channel banks where sedimentation is excessive and at the base of all slopes adjacent to wetland/riparian areas. Trench plugs would be employed during pipeline construction at nonflumed drainage crossings to prevent diversion of drainage channel flows into upland portions of pipeline trenches. Application of riprap would be limited to areas where flow conditions prevent vegetative stabilization. Riprap placement and installation would comply with COE permit requirements. Pipeline trenches would be dewatered so no silt-laden water flows into drainage channels. Where vegetation is disturbed, temporary sediment barriers such as silt fences and/or staked weed-free straw bales would be installed along the topographic contour at the base of slopes adjacent to the ROW crossing. Temporary sediment barriers would remain in place until permanent revegetation measures have been judged successful by the BLM.

B.4.0 INTERIM RECLAMATION

Interim reclamation would occur on all areas where permanent reclamation is not promptly applied and on areas that may be disturbed during final reclamation. Disturbed areas subject to interim reclamation include road cut-and-fill areas and portions of each wellpad and ancillary facility site not needed for production-related activities (production reclamation), and topsoil and subsoil stockpiles (temporary reclamation). Interim reclamation measures would be applied only as needed, since permanent reclamation measures would be applied concurrently with the completion of most project construction activities (i.e., permanent reclamation measures would be applied on all areas that would likely remain undisturbed for the remainder of the LOP) (see Section B.5.0).

Interim reclamation objectives include:

- stabilization of disturbed areas by providing wind and water erosion control to reduce soil loss and the chance of slope failure;
- minimization of surface runoff to prevent the degradation of downstream receiving waters through the use of pollution control techniques (e.g., facility sites would be required to approach zero runoff from the location, using interception ditches, berms, or other structures to capture accidental spills);
- establishment of nonintrusive plant communities to protect soil resources; and
- minimization of visual impacts.

Upon completion of a specific development activity (e.g., road construction, well testing), the area to be reclaimed for the LOP would be delineated. For example, all road topsoil storage in outslope areas, as well as the potentially disturbed outer portions of road ROWs, would be stabilized and reseeded until permanent road reclamation is initiated. Permanent reclamation practices (see Section B.5.0) would be applied on areas that would likely remain undisturbed for the remainder of the LOP.

Disturbed areas would be graded and contoured to slopes of 3:1 (horizontal:vertical) or less, as required to stabilize the area and provide a suitable seedbed. Contoured areas would be ripped, as necessary, to reduce soil compaction. Ripping in many areas may be conducted after topsoil replacement. Temporary erosion control measures (e.g., waterbars, mulch application, biodegradable netting installation) also would be applied as necessary. To minimize sedimentation of drainage channels and wetlands during the interim period between construction activity and final reclamation, temporary erosion and sediment control measures would be applied. Silt feaces or other sediment filtering devices such as weed-free straw bales would be installed at drainage channel banks where sedimentation is excessive and at the base of all slopes adjacent to wetland/riparian areas. Sediment filtering devices would be cleaned out and maintained in functional condition throughout the LOP. To avoid the possibility of mulching materials entering waterways, loose mulch (i.e., mulch not crimped into the soil surface, tackified, or incorporated into erosion control blankets) would not be applied to drainage channel banks.

Seedbed preparation activities would include topsoil replacement and harrowing, discing, pitting, and/or ripping. After topsoil replacement and preparation, the area would be seeded at the first appropriate opportunity using a temporary seed mixture developed to facilitate the rapid establishment of vegetation (Table B.4.1) or a seed mixture designed for permanent reclamation (see Section B.5.0), as appropriate. Areas that have been seeded would be visually monitored for seedling establishment and the presence of erosional features, and would be restabilized and reseeded, as necessary, until adequate vegetation establishment and site stability is achieved (see Section B.6.0). In general, the permanent reclamation and success monitoring procedures specified in Sections B.5.0 and B.6.0 also would be applied at interim reclamation sites.

Table B.4.1 Temporary Reclamation Seed Mixture and Approximate Seeding Rates.[1]

Species	Approximate Seeding Rate (PLS/ac)[2]
Western wheatgrass (*Elymus smithii*)	2.0
Slender wheatgrass (*Elymus trachycaulum*)	2.0
Streambank wheatgrass (*Elymus riparium*)	2.0
Winter wheat (*Triticum aestivum*)[3]	10.0
Total	16.0

1 Alternative species may be reseeded in areas where permanent reclamation may be warranted and/or where the establishment of proposed species is repeatedly deemed unsuccessful. It is anticipated that this seed mixture primarily would be used on topsoil and subsoil stockpiles designated for long-term storage.

2 PLS/ac = pounds of pure live seed per acre; alternate seeding rates may be applied in some areas as deemed appropriate by the BLM and specified in approved Surface Use Plans and/or Plans of Development.

3 A sterile hybrid would be seeded as a cover crop; cover crops would be used only in areas where rapid site stabilization is desired and where further reseeding efforts likely would be conducted.

B.5.0 PERMANENT RECLAMATION

Disturbed areas would be reclaimed permanently as soon as practical, but within 2 years of the determination that these areas are no longer required for the project. Permanent reclamation objectives include all those listed for interim reclamation (see Section B.4.0), plus the following:

- the reestablishment of self-sustaining native vegetation communities that meet or exceed predisturbance parameters for cover, production, and diversity, as measured at adjacent undisturbed areas;
- the development of hydrologically stable landforms that meet future land uses including livestock grazing, wildlife habitat, recreation, and mineral exploration; and
- the restoration of the visual quality of the area such that it approximates the visual quality of adjacent undisturbed areas in line, form, color, and texture.

B.5.1 FACILITY AND STRUCTURE REMOVAL

All gas and water wells would be abandoned according to BLM and/or Wyoming Oil and Gas Conservation Commission regulations. All aboveground wellpad, pipeline, and water disposal facilities, including buildings, structures, tanks, reserve pits, flare pits, evaporation pits, and associated hardware, would be dismantled and removed from the site. These materials would be removed from BLM lands and likely would be salvaged and re-used or disposed of at approved sites.

Any liquid or solid wastes remaining at well locations would be tested and properly disposed of according to state and federal regulations. Reserve or evaporation pit liners would be disposed of according to BLM recommendations by removal to state-approved sites or by appropriate on-site burial. Any concrete foundations, pads, or footings would be adequately broken up and covered or removed. All aggregate used for wellpad, road, and/or ancillary facility site construction also would be removed or suitably buried.

Road reclamation would be conducted as deemed appropriate by the BLM; some roads may remain after project completion. Road reclamation would include the removal of bridges, culverts, cattleguards, sediment control structures, and signs. Drainage-crossing sideslopes would be reduced to no more than 4:1 to reduce bank erosion and produce stable sideslopes. In addition, road barriers or signs to discourage travel on the reclaimed road surface may be required by the BLM.

B.5.2 SURFACE PREPARATION

Surface preparation includes backfilling, grading, and ripping of compacted soils. In some areas subjected to interim reclamation (see Section B.4.0), topsoil removal and short-term storage may also be required.

B.5.2.1 Backfilling and Grading

After facilities and equipment have been removed, all disturbed areas would be recontoured by placing fill material back into cut areas to approximate original contours. Cut-and-fill slopes would be reduced to approximate original contours. Grading would provide a surface suitable for the replacement of a uniform depth of topsoil, while promoting cohesion between subsoil and topsoil layers, reducing wind erosion, and facilitating moisture capture.

Specialized grading techniques would be applied as necessary and may include slope rounding, bench grading, stair-step grading, and/or contour furrowing. Generally, these processes are accomplished either with scrapers or motor graders. Equipment selection would be determined on a site-specific basis dependent on the material to be graded, the size of the area, on-site operating conditions, and equipment availability.

Areas generally requiring backfilling include reserve pits, evaporation pits, pipeline trenches, and cut-and-fill areas. No visible soil berm (i.e., in excess of 3 inches) would be allowed above pipeline trenches. Operator-provided reclamation specialists would ensure that backfilling and grading operations are conducted so as to provide a landscape suitable for successful reclamation.

B.5.2.2 Ripping

Compacted areas such as roads and wellpads would be ripped to a minimum depth of approximately 2 ft to improve soil aeration, water infiltration, and root penetration. Ripper shanks would be set

approximately 2 ft apart. Waterbars and erosion control devices would be installed on reclaimed areas prior to topsoil replacement, as necessary, to control topsoil erosion (see Section B.5.5).

B.5.3 SEEDBED PREPARATION

Seedbed preparation maximizes seeding efficiency and improves reclamation success. It includes topsoil replacement (with amendments, where appropriate) and discing. Surface roughening procedures (e.g., pitting, gouging) also may be applied in some locations.

B.5.3.1 Topsoil Replacement

All topsoil salvaged during construction would be redistributed uniformly on the area to be reclaimed to depths of at least 6 inches, or more (up to 12 inches), if readily available, using a scraper or dozer, as appropriate for the material and site. Topsoil replacement would be scheduled immediately prior to seeding to maximize the potential for seedling establishment. Topsoil may require inoculation with soil microorganisms or fertilization at some locations to facilitate plant establishment and growth. Since precipitation in the J2PA is low, fertilizers generally would not be applied. Fertilizers would not be utilized proximal to open waters.

B.5.3.2 Discing

After topsoil replacement, newly topsoiled areas would be disced, harrowed, or ripped to reduce soil compaction, break up soil clods, improve root and water penetration, and provide a friable but firm seedbed. The Operator-provided reclamation specialist would determine how discing or harrowing would be accomplished. Generally, discing would be accomplished using a tractor-drawn implement set 2-6 inches deep.

B.5.4 REVEGETATION PRACTICES

B.5.4.1 Seeding

Reclaimed areas would be seeded using specific native species and seeding rates for the various soil and vegetation types present on the J2PA (Tables B.5.1-B.5.5). All seeds utilized for this project must be certified weed-free. The proposed seed mixes were developed based on the following criteria: general conditions within the analysis area; species adaptations to site conditions; usefulness of the species for rapid site stabilization; species success in past revegetation efforts; seed costs and availability; and compliance with Executive Order 11987 and BLM Manual Section 1745 (i.e., use of native species only). Certain introduced species have been used successfully for reclamation in the region; these species may have utility in site stabilization and revegetation where revegetation efforts with native species repeatedly have been unsuccessful. Operators would consult with the BLM and acquire BLM approval prior to the use of introduced species. Seed mixtures applied during revegetation would be designed in coordination with the BLM during the APD and ROW application approval processes.

Final determination of the appropriate seed mixture would be developed on a site-specific basis in coordination with the BLM at the time of field review (APD and ROW application review). Selected seeds may be inoculated with soil microorganisms to facilitate germination and growth. Soil and watershed protection would be emphasized when reclaiming disturbed areas. Reclaimed areas not exhibiting successful revegetation, as determined during monitoring (see Section B.6.0) would be reseeded and/or improved with soil amendments as deemed necessary by the BLM until adequate vegetative cover is established.

Seeding generally would be done in the fall between September 16 and freeze-up; however, some areas may be seeded in the early spring between spring thaw and May 15. Wherever possible, seed planting would be done along the contour using a rangeland drill equipped with an agitator and depth bands to mix seed and ensure proper seeding depths. Seeds would be planted 0.25 to 1.50 inches deep; most seeds would be planted 0.25 inches deep. When drill seeding is not practical due to steep slopes or wet soil conditions, broadcast seeding would be employed, seeding rates would be doubled, and the area would be raked or chained to cover seeds. To facilitate seed establishment, broadcast seeding may be used for shrub and forb species, utilizing either hand or specialized broadcast seeders; fluffy seeds (e.g., winterfat) may be broadcast simultaneously with drilled seeds. In addition, at sites where rapid shrub and/or tree establishment is desirable, bare-rooted or containerized stock may be hand-planted. Depending on site-specific circumstances, broadcast seeding may

Table B.5.1 Permanent Reclamation Species List for Sagebrush-dominated Communities with Sandy Soils.[1]

Species	Approximate Seeding Rate (PLS/acre)[2]
Grasses	
Thickspike wheatgrass (*Elymus dasystachyum*)	2.00
Western wheatgrass (*Elymus smithii*)	2.00
Bluebunch wheatgrass (*Elymus spicatum*)	2.00
Indian ricegrass (*Oryzopsis hymenoides*)	3.00
Needle-and-thread (*Stipa comata*)	3.00
Forbs[3]	
Desert Indian paintbrush (*Castilleja chromosa*)	1.00
Scarlet globemallow (*Sphaeralcea coccinea*)	1.00
Shrubs[3]	
Wyoming big sagebrush (*Artemisia tridentata wyomingensis*)	0.25
Common winterfat (*Kraschenninikovia lanata*)	1.00
Four-wing saltbush (*Atriplex canescens*)	3.00
Antelope bitterbrush (*Purshia tridentata*)	1.00

1 This seed mix may be modified based on site-specific conditions, the identification of additional useful species for rapid site stabilization, species success in past revegetation efforts, and seed availability and cost.
2 PLS/acre = pounds of pure live seed per acre; alternative seeding rates may be applied in some areas as deemed appropriate by the BLM and specified in approved Surface Use Plans and/or Plan of Development.
3 It is unlikely that all the forb and shrub species shown would be used at any one time.

Table B.5.2 Permanent Reclamation Species List for Sagebrush-dominated Communities with Alkaline Soils.[1]

Species	Approximate Seeding Rate (PLS/acre)[2]
Grasses	
Western wheatgrass (*Elymus smithii*)	3.00
Thickspike wheatgrass (*Elymus dasystachyum*)	3.00
Alkaligrass (*Puccinellia distans*)	3.00
Alkali sacaton (*Sporobolus airoides*)	3.00
Forbs[3]	
Scarlet globemallow (*Sphaeralcea coccinea*)	1.00
Evening primrose (*Oenothera* sp.)	1.00
Shrubs[3]	
Wyoming big sagebrush (*Artemisia tridentata wyomingensis*)	0.25
Common winterfat (*Krascheninnikovia lanata*)	1.00
Four-wing saltbush (*Atriplex canescens*)	3.00
Gardner saltbush (*Atriplex gardneri*)	1.00

1 This seed mix may be modified based on site-specific conditions, the identification of additional useful species for rapid site stabilization, species success in past revegetation efforts, and seed availability and cost.
2 PLS/acre = pounds of pure live seed per acre; alternative seeding rates may be applied in some areas as deemed appropriate by the BLM and specified in approved Surface Use Plans and/or Plans of Development.
3 It is unlikely that all the forb and shrub species shown would be used at any one time.

Table B.5.3 Permanent Reclamation Species List for Saltbush Communities.[1]

Species	Approximate Seeding Rate (PLS/acre)[2]
Grasses	
Sandberg bluegrass (*Poa sandbergii*)	1.0
Western wheatgrass (*Elymus smithii*)	2.0
Thickspike wheatgrass (*Elymus dasystachyum*)	2.0
Alkaligrass (*Puccinellia distans*)	3.0
Alkali sacaton (*Sporobolus airoides*)	3.0
Forbs[3]	
Gooseberryleaf globemallow (*Sphaeralcea grossulariaefolia*)	1.0
Northern sweetvetch (*Hedysarum boreale*)	1.0
Evening primrose (*Oenothera* sp.)	1.0
Shrubs[3]	
Four-wing saltbush (*Atriplex canescens*)	3.0
Shadscale (*Atriplex confertifolia*)	1.0
Gardner saltbush (*Atriplex gardneri*)	1.0
Common winterfat (*Krascheninnikovia lanata*)	1.0

1 This seed mix may be modified based on site-specific conditions, the identification of additional useful species for rapid site stabilization, species success in past revegetation efforts, and seed availability and cost.
2 PLS/acre = pounds of pure live seed per acre; alternative seeding rates may be applied in some areas as deemed appropriate by the BLM and specified in approved Surface Use Plans and/or Plans of Development.
3 It is unlikely that all the forb and shrub species shown would be used at any one time.

Table B.5.4 Permanent Reclamation Species List for Playas and other Alkaline Areas.[1]

Species	Approximate Seeding Rate (PLS/acre)[2]
Grasses	
Muhly (*Muhlenbergia* spp.)	2.0
Alkaligrass (*Puccinellia distans*)	3.0
Alkali sacaton (*Sporobolus airoides*)	3.0
Western wheatgrass (*Elymus smithii*)	3.0
Forbs[3]	
Gooseberryleaf globemallow (*Sphaeralcea grossulariaefolia*)	1.0
Northern sweetvetch (*Hedysarum boreale*)	2.0
Shrubs[3]	
Four-wing saltbush (*Atriplex canescens*)	3.0
Gardner saltbush (*Atriplex gardneri*)	1.0

1 This seed mix may be modified based on site-specific conditions, the identification of additional useful species for rapid site stabilization, species success in past revegetation efforts, and seed availability and cost.
2 PLS/acre = pounds of pure live seed per acre; alternative seeding rates may be applied in some areas as deemed appropriate by the BLM and specified in approved Surface Use Plans and/or Plans of Development.
3 It is unlikely that all the forb and shrub species shown would be used at any one time.

Table B.5.5 Permanent Reclamation Species List for Stabilized Sand Dune Communities.[1]

Species	Approximate Seeding Rate (PLS/acre)[2]
Grasses	
Prairie sandreed (*Calamovilfa longifolia*)	3.00
Bluebunch wheatgrass (*Elymus spicatum*)	2.00
Sand dropseed (*Sporobolus cryptandrus*)	2.00
Indian ricegrass (*Oryzopsis hymenoides*)	2.00
Needle-and-thread (*Stipa comata*)	2.00
Basin wildrye (*Elymus cinerus*)	1.00
Forbs[3]	
Gooseberryleaf globemallow (*Sphaeralcea grossulariaefolia*)	1.00
Desert Indian paintbrush (*Castilleja chromosa*)	1.00
Northern sweetvetch (*Hedysarum boreale*)	1.00
Shrubs[3]	
Wyoming big sagebrush (*Artemisia tridentata wyomingensis*)	0.25
Spiny hopsage (*Grayia spinosa*)	1.00

1 This seed mix may be modified based on site-specific conditions, the identification of additional useful species for rapid site stabilization, species success in past revegetation efforts, and seed availability and cost.
2 PLS/acre = pounds of pure live seed per acre; alternative seeding rates may be applied in some areas as deemed appropriate by the BLM and specified in approved Surface Use Plans and/or Plans of Development.
3 It is unlikely that all the forb and shrub species shown would be used at any one time.

be accomplished following mulch and crimping operations.

B.5.4.2 Mulching

Immediately following seeding, selected areas with a high erosion potential (e.g., steeply sloped areas along roads and/or pipelines, sandy soil areas) would be uniformly mulched (75% minimum cover) with native grass, hay, small grain straw, wood fiber, and/or live mulch, at a rate of approximately 1-2 tons/acre. Cotton, jute, or synthetic netting also may be applied at some sites. Only certified weed-free mulches would be used, thereby minimizing the potential for noxious weed introduction. Mulch would be crimped in place using a serrated disc crimper or similar implement. Mulch protects the soil from wind and water erosion, raindrop impact, and surface runoff and holds seeds in place. On slopes of greater than 30% or exceeding the operating limits of the equipment, or sites containing 35% surface rock content, sandy soil areas, or other unstable areas, hydromulch, biodegradable erosion control netting, rock mulch, or matting attached firmly to the soil surface would be applied, as necessary.

B.5.5 SEDIMENTATION AND EROSION CONTROL DEVICES

Erosion and sediment control measures and structures would be installed, as appropriate, on all reclaimed areas. The type of control measure used would depend on slope gradient and the susceptibility of disturbed soils to wind and water erosion. Runoff control along linear disturbances such as roads and pipelines would be accomplished using standard measures including, but not limited to, waterbars, silt fences, energy dissipators, mulches, and cross ditches. Waterbars would be installed in accordance with standard BLM specifications and would begin and end in undisturbed vegetation. Waterbars generally would be 12-18 inches deep, have a 2% grade, and be sloped such that disturbed areas are crossed only once and water is not discharged onto disturbed areas. Silt fences would be placed at the base of all steep fill slopes. Instream protection devices (e.g., drop structures) also may be required to prevent erosion in drainages crossed by pipelines. Information on the techniques to be implemented, as determined based on site-specific conditions and associated BLM interdisciplinary team requirements, would be included in APDs, ROW applications, Sundry Notice Surface Use Plans, and/or PODs.

Additional runoff and erosion control along ROWs would be accomplished by implementing standard cross drain, culvert, road ditch, and turnout design, as well as timely stabilization and revegetation of exposed areas. Culvert entrances and exits would be riprapped or protected with energy dissipators or other scour-reducing techniques, as needed, and where appropriate. Water discharged from culverts, cross drains, road ditches, and turnouts would be directed appropriately either into undisturbed vegetation or natural drainages. Erosion and sedimentation control measures and structures, as approved by the BLM, would be installed across all cut-and-fill slopes within 100 ft of drainage channels. All runoff and erosion control structures would be inspected by the Operators annually and after major runoff events and would be maintained (e.g., cleaned out) throughout the LOP.

B.6.0 RECLAMATION SUCCESS MONITORING

Reclamation success would be based on the objectives specified in this plan, and monitoring would occur annually or at shorter intervals until reclamation efforts are deemed successful by the BLM. Monitoring activities would evaluate the condition of reclamation efforts, determine the prognosis for reclamation success, and determine the need for remediation. Additional monitoring procedures for quantitative and qualitative evaluations of reclamation success may be implemented as specified in BLM-approved Surface Use Plans or PODs. Standard revegetation success criteria involve the attainment of 50% of predisturbance vegetation cover in 2 years and 60% cover in 5 years. Basal cover is used for grasses and forbs, and leaf cover is measured for shrubs.

The monitoring program presented herein is designed to provide an approach to reclamation monitoring on the J2PA and includes evaluations which would assist in making future land management decisions in the area. More specific objectives include:

- delineation of monitoring responsibilities;
- identification of reclamation success criteria; and
- specification of monitoring protocols.

Both interim and permanent reclamation success would be monitored. Interim reclamation monitoring would include visual observations of soil stability, effectiveness of erosion control practices, and qualitative evaluations of vegetation establishment and assessments of weed invasion. The Operators would be responsible for weed control on surface disturbance and reclamation sites. If chemical weed controls are deemed necessary, chemicals would be used only in the season or growth stage during which they are most effective, and would be applied only by certified personnel using approved precautions, application methods, and rates in compliance with all applicable federal, state, and local regulations. Use of herbicides would be avoided near open waters or during extremely windy conditions.

Permanent reclamation would be monitored visually for soil stability, particularly near wetland/riparian areas, open waters, or ephemeral stream channels. Mulch effectiveness and other erosion control devices would be assessed, and qualitative evaluations of vegetation establishment and success would be made. Quantitative measurements for vegetation success as measured by percent cover, production, shrub establishment, and/or measures of diversity would be implemented as specified by the BLM. If reclamation monitoring reveals that soil stability, weed abundance, or vegetation establishment/productivity do not meet required standards, additional treatments would be undertaken promptly by the Operators, in cooperation with the BLM. Continued efforts would be required until satisfactory vegetative cover and productivity are achieved and the site is adequately stabilized. Additional treatments could include, but are not limited to, installation of additional erosion control devices, fencing, herbicide or fertilizer application, reseeding, or remulching.

B.6.1 MONITORING RESPONSIBILITY

Reclamation monitoring would be the responsibility of the BLM and would be accomplished through joint, coordinated monitoring efforts. Monitoring would be conducted following initial reclamation work, and reexamination would occur at the end of the first growing season. Results would be reported on forms as presented in Addendum A. Problem areas identified during monitoring would receive follow-up reconstruction/erosion control measures. If required, the BLM would revisit monitoring sites during the second or third growing seasons, and sites would be reassessed using the same methodologies initially applied. If required, monitoring results would be provided to the Operators to show progress and call attention to additional stabilization/reclamation needs. Additional monitoring sites would be established, as necessary, by the BLM (in coordination with the Operator) for "long-term" monitoring on significant problem areas not covered by initial efforts.

Follow-up monitoring would be conducted periodically by the BLM until reclamation goals are attained (see Section B.6.3). Once reclamation goals are attained, no further formal monitoring would be conducted. It is expected that most monitoring sites would reveal adequate site reclamation within approximately 5 years; therefore, monitoring activities usually would be discontinued after 5 years. This would allow personnel to concentrate on monitoring installation and evaluation on "long-term" problem sites. Operators would be advised of reclamation status through joint review of monitoring sites.

Generally, reclamation success would be based on site-specific potential. Revegetation objectives and success criteria would be tailored to site potential. When the site has reached long-term stabilization and the composition of desired forage is consistent with objectives and criteria, the monitoring site would be abandoned. Monitoring data would be compiled by the BLM to provide future guidance for successful reclamation planning.

B.6.2 MONITORING PROTOCOL

The forms presented in Addendum A serve as guidelines for the collection of site-specific information, documentation of treatments, and a record for evaluation. Alternative forms may be used as deemed appropriate by the BLM.

The forms presented in Addendum A or other BLM-approved forms would be used for annual monitoring conducted by the BLM during the first growing season and during subsequent years and until reclamation is deemed successful. Data collection would take place during July, August, and September using point sampling transects on adjacent undisturbed areas of the same vegetation type, and if additional reclamation work is necessary, Operators would be required to conduct this work.

B.6.3 GENERAL SUCCESS CRITERIA

The following success criteria would be used to determine the attainment of adequate site reclamation and whether bond liability should be released. Additional success criteria (e.g., productivity, diversity, shrub establishment) would be included, as necessary, in site-specific Surface Use Plans and/or PODs and would be approved by the BLM prior to site disturbance.

B.6.3.1 General Criteria

- There would be no contaminated materials remaining at or near the surface, and all buried undesirable materials would be physically isolated for long-term stabilization.
- The subsurface would be stabilized, holes would be plugged, and subsurface integrity would be ensured. No indications of open or unplugged holes, subsidence, slumping, and/or significant downward movement of surface soil materials would be visible.
- The reclaimed area would be stable and would not exhibit rills or gullies (e.g., >2 inches wide/deep), perceptible soil movement or head cutting in drainage, and/or slope instability on or adjacent to the reclaimed area.
- The soil surface would be stable and have adequate surface roughness to reduce runoff and capture rainfall and snow melt.
- The vegetation would stabilize the site and support postdisturbance land uses, provide for natural plant community succession and development, and be capable of renewing itself. There would be evidence of successful on-site establishment of species included in the planting mixture or other desirable species and/or evidence of vegetation reproduction, either spreading by rhizomatous species or seed production.
- The reclaimed landscape would have characteristics that approximate the visual quality of the adjacent area with regard to location, scale (e.g., line, form, and texture), shape, color, and orientation of major landscape features and would meet the needs of the postdisturbance land uses.
- During and following reclamation activities, Operators would monitor and protect the reclaimed landscape to help ensure reclamation success until the liability and bond are released. Each of the previous six standards would be maintained until it can be determined that the reclamation effort was successful.
- With the exception of active work areas, all disturbed highly erosive or sensitive areas to be left bare or unreclaimed for more than three months would be covered by a protective layer of suitable material (e.g., mulch, matting, or vegetative growth). All other disturbed areas would be adequately protected within six months.

B.6.3.2 Second Year (Final Reclamation) Criteria

- Seeding density. The density and abundance of desirable species on reclaimed areas would be considered adequate where they approximate conditions found on off-site/undisturbed areas.
- Percent cover. Total grass and forb vegetative cover (basal) would be at least 50% of predisturbance cover as measured along the reference transect for establishing baseline conditions.
- Species diversity. At least 20% of the species contained in the seed mix and/or present on adjacent areas would be present, and no single species would account for more than 80% of the total vegetative cover.
- Undesirable species. Weeds or other undesirable species would comprise no more than 10% of the total vegetative cover. All noxious weeds would be controlled, as appropriate.

B.6.3.3 Fifth Year (Final Reclamation) Criteria

- Percent cover. Total vegetative cover (basal for grasses and forbs and foliar for shrubs) would be at least 60% of predisturbance cover as measured along the reference transect for establishing baseline conditions.
- Dominant species. Ninety percent of the revegetation would consist of species included in the seed mix and/or occurring in the surrounding natural vegetation, or as would be deemed desirable by the BLM as measured along the reference transect for establishing baseline conditions.
- Erosion condition/soil surface factor. Erosion condition of reclaimed areas would be equal to or in better condition than that measured for the reference transect for establishing baseline conditions.

B.7.0 REFERENCES

Bureau of Land Management. 1985. Manual 9113: Roads. Engineering, Rel. 9-247. U.S. Department of the Interior, Bureau of Land Management.

_____. 1987a. Pinedale Resource Area Draft Resource Management Plan/Environmental Impact Statement. Bureau of Land Management, Rock Springs District, Rock Springs, Wyoming, and Pinedale Resource Area, Pinedale, Wyoming.

_____. 1987b. Pinedale Resource Area Final Management Plan/Environmental Impact Statement. Bureau of Land Management, Rock Springs District, Rock Springs, Wyoming, and Pinedale Resource Area, Pinedale, Wyoming.

_____. 1990c. Wyoming Policy on Reclamation. U.S. Department of the Interior, Bureau of Land Management, Rawlins District Office, Rawlins, Wyoming. February 2, 1990.

_____. 1991a. Wyoming Supplement to the Bureau 9113 Manual. U.S. Department of the Interior, Bureau of Land Management, Wyoming State Office, Cheyenne, Wyoming. 16 pp.

ADDENDUM B-A:

RECLAMATION MONITORING FORMS

(Alternative forms may be employed)

INSPECTION REPORTS, U.S. DEPARTMENT OF THE INTERIOR, BUREAU OF LAND MANAGEMENT
OIL AND GAS SURFACE INSPECTION FORM – ACTIVE LOCATIONS **PRINTED: 91/12/20**

Inspector:_____ Date:_____ Sma:_____ Qtr/Qtr:_____

Well Name:_____ Well No.:_____ Well Status:_____ Sect:_____

Operator:_____ ROW Ref.:_____ Twn:_____

Lease No.:_____ Representative:_____ Rng:_____

Insp. Item I.D.:_____ Unique Well No.:_____ Insp. No.:_____

STATUS: Construction:_____ Drilling:_____ Production:_____
Estimated Acres Disturbed:_____ Estimated Acres Reclaimed:_____

S/U/A:

_____ **ROAD:** Earthwork:_____ Culverts/Drainage:_____
Surface Material:_____ Revegetation:_____
Remarks:_____

_____ **PAD:** Earthwork:_____ Culverts/Drainage:_____
Gen. Condition:_____ Revegetation:_____
Remarks:_____

_____ **PITS:** Type: Reserve:_____ Production:_____
Earthwork:_____ Fluid/Oil:_____
Pits: Lined:_____ Unlined:_____ Fenced:_____ Unfenced:_____
Remarks:_____

_____ **FACILITIES:** Well Sign:_____ Paint:_____
Production/Drilling Facility Layout (including dikes):_____
Pipeline:_____ Power Line:_____ As Approved:_____
Remarks:_____

ACTION REQUIRED:
Verbal Follow-up:_____ Letter:_____ INC Written:_____
Notify P.E.T.:_____ Other:_____

Correct Problem By:_____ Next Inspection:_____
Inspection Hours:_____ Signature:_____

U.S. DEPARTMENT OF THE INTERIOR, BUREAU OF LAND MANAGEMENT **Page 1 of 2**
OIL AND GAS SURFACE INSPECTION FORM -- ABANDONED LOCATIONS **PRINTED: 91/12/20**

Inspector:_____ Date:_____ Sma:_____ Qtr/Qtr:_____

Well Name:_____ Well No.:_____ Well Status:_____ Sect:_____

Operator:_____ ROW Ref.:_____ Twn:_____

Lease No.:_____ Representative:_____ Rng:_____

Insp. Item I.D.:_____ Unique Well No.:_____ Insp. No.:_____

STATUS: Construction:_____ Drilling:_____ Production:_____
Estimated Acres Disturbed:_____ Estimated Acres Reclaimed:_____

S/U/A:

_____ **ROAD:** Recontoured:_____ Revegetation:_____ Erosion:_____
Remarks:_____

_____ **PAD/PIT:** Recontoured:_____ Revegetation:_____ Erosion:_____
Remarks:_____

OTHER INFORMATION:

Dry Hole Marker:_____ Water Well Plugged:_____
Seeding Date:_____ Growing Season (1-99 years):_____
Seeding Method: Drill:_____ Broadcast:_____ Other:_____
Species Required:_____

Species Present:_____

Remarks:_____

SITE RECOMMENDATION:

Remedial Action Needed:_____ Reclamation Acceptable:_____
Remarks:_____

Correct Problem By:_____ Next Inspection:_____
Inspection Hours:_____ Signature:_____

U.S. DEPARTMENT OF THE INTERIOR, BUREAU OF LAND MANAGEMENT **Page 2 of 2**
OIL AND GAS SURFACE INSPECTION FORM -- ABANDONED LOCATIONS **PRINTED: 91/12/20**

VEGETATION CONDITION RATING:

Revegetation % Cover	**Reference Vegetation % Cover**
___% Bare Ground	___% Bare Ground
___% Plant	___% Plant
___% Litter	___% Litter
___% Rock	___% Rock
___% Total (Plant, Litter, and Rock)	___% Total (Plant, Litter, and Rock)

Predisturbance Rating:_____ (reveg. cond. total/refer. cond. total x 100)

APPENDIX C

ENVIRONMENTAL STANDARDS, PROCEDURES, AND REQUIREMENTS FOR IMPLEMENTATION OF THE JONAH FIELD II NATURAL GAS DEVELOPMENT PROJECT

Record of Decision - Jonah Field II Natural Gas Development Project

TABLE OF CONTENTS

STANDARD PRE-CONSTRUCTION PLANNING, DESIGN, CONSTRUCTION AND RECLAMATION PRACTICES FOR SURFACE DISTURBING ACTIVITIES

Preconstruction Planning and Site Layout

Pursuant to Onshore Oil and Gas Orders Nos. 1 and 2, each proposed well will require an APD approved by BLM prior to any surface disturbance. Each APD will contain site-specific information regarding all facets of well development including environmental concerns, and a site-specific EA will be prepared for each APD. The Operators and/or their contractors and subcontractors will conduct all phases of project implementation, including well location, road and pipeline construction, drilling and completion operations, maintenance, reclamation, and abandonment in full compliance with all applicable federal, state, and local laws and regulations and within the guidelines specified in approved APDs, ROW permits, and site-specific EAs and DRs. Lessees and operators will be fully accountable for their contractor's and subcontractor's compliance with the requirements for the approved permit and/or plan. Access roads and pipelines constructed and/or used by the Operators will require ROW authorizations.

Well Pad and Road Construction

Well Pads

The entire well pad area will be cleared of all vegetation, and up to 12 inches of topsoil will be removed from all areas of cut, fill, and/or subsoil storage. Topsoil will be stockpiled for future use in reclamation. After the topsoil has been removed, the pad will be graded to prepare a level working surface. Fugitive dust emissions during well pad construction will be controlled by watering. Each well location will be designed so that the amount of cut and fill material will "balance," where feasible, thereby minimizing the need to stockpile excess subsoil adjacent to the well location until site reclamation. Materials excavated from the reserve pit will be stockpiled adjacent to the reserve pit and used to backfill the pit during reclamation.

The leveled area required for drilling and completion of each well will be approximately 2.25 acres. In addition, an average of 0.25 acres will be required for cut/fill slopes and subsoil stockpiles, resulting in total average surface disturbance of 2.5 acres/well.

Erosion control will be maintained through prompt revegetation and by constructing surface water drainage controls such as berms, diversion ditches, and sediment ponds as necessary at each well location according to the Reclamation Plan (Appendix D). All diversion ditches and other surface water and erosion control structures at each location will be shown on topographic relief maps provided with each APD. Stormwater Pollution Prevention Plans (SWPPPs) will be prepared for all well locations, access roads, and other disturbances of more than 5 acres in compliance with the DEQ requirements.

Roads

New road construction will average approximately 0.4 mile/location (1.9 acres disturbance/location initially [40-foot disturbance width] and 1.2 acres disturbance/location for the LOP [24-foot disturbance width]). Roads will be designed by a licensed professional engineer as deemed necessary by the BLM, and all roads will be built in accordance with guidelines established for oil and gas exploration and development activities in BLM Manual Section 9113 (BLM 1985, 1991a). Fugitive dust emissions during well pad construction will be controlled by watering. On completion of construction activities, the engineer will certify

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that the road was constructed in accordance with the approved road construction design, as deemed necessary by the BLM. Any deficiencies will be corrected to ensure compliance with both the approved Road Construction Plan and the APD. Once road construction is complete, all but 24 feet of the ROW will be reclaimed and revegetated. In addition, road construction, upgrading, maintenance, and reclamation activities will be planned in accordance with the Transportation Plan for this project (see Appendix A).

Aggregates used for road and well location construction will be acquired from commercial sources primarily on federal and state lands on and adjacent to the project area. Prior to aggregate extraction, appropriate permits will be obtained from the BLM and/or WDEQ/Land Quality Division (LQD), as appropriate. Aggregates will be free of noxious weeds.

Drilling Operations

The drilling operation will utilize a water-based mud system with additives to minimize downhole problems. Drilling will require approximately 1.5 barrels (bbl) of water (42 gal/bbl) per foot of hole drilled--an average of 18,000 bbl of water (2.3 acre-feet) per well location (approximately 860 bbl of water/rig/day). Drilling water will be obtained from one or more of six primary sources:

1) the Jonah #1-4W water well in NE¼SW¼ of Section 4, T28N, R108W (Permit #UW-87834), which produces 90 gal of water/minute and has on-site storage capacity of 600 bbl (two 300-bbl steel tanks);

2) the Jonah #16-20 water well in SE¼SE¼ of Section 20, T29N, R108W (Permit #UW-99142), which produces 90 gal of water/minute and has on-site storage capacity of 400 bbl (one 400-bbl steel tank);

3) the Stud Horse Butte #13-27W water well in SW¼SW¼ of Section 27, T29N, R108W (Permit #UW-103561), which produces 90 gallons of water/minute and has on-site storage capacity of 400 bbl (one 400-bbl steel tank);

4) the Ultra water well in SW¼SW¼ of Section 23, T29N, R108W;

5) the McMurry well in NE¼SW¼ of Section 26, T29N, R108W; and

6) additional water wells to be drilled on existing well pads at strategic locations throughout the project area and provided with steel tanks for on-site storage, contingent upon approval of an *Application for Permit to Appropriate Ground Water* by the Wyoming State Engineer and an approved APD by BLM.

Water and drilling additives will be contained in reserve pits, which will be lined as directed by the BLM to conserve water and protect near-surface water aquifers. If diesel is used in the mud, it will be recovered in tanks before it gets into the reserve pit. Trenches around the drilling rig will have siphons installed to prevent any oil and grease that is washed off the rig from entering the reserve pit. Reserve pits will be lined with synthetic materials where potassium chloride or other undesirable materials are proposed for use in drilling or fracturing fluids. In addition, siphons will be constructed at each reserve pit to collect, as necessary, any undesirable materials that may enter the pits. Reserve pits will be fenced on the three nonworking sides during drilling to protect wildlife and livestock, and on the fourth side immediately following removal of the drilling rig. Fencing will be installed in accordance with BLM/USFS/WGFD guidelines and maintained until the reserve pit is backfilled. Netting (1-inch mesh) will be placed over reserve pits containing hydrocarbons or other substances

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toxic to wildlife, in compliance with BLM Informational Bulletin Number WY-93-054.

Surface casing will be set to a depth adequate to isolate near-surface freshwater aquifers (an estimated 2,500 feet). Production casing will be run and cement circulated to a minimum of 400 feet above the Lance Formation, effectively isolating all geologic formations and eliminating any fluid migration between hydrocarbon-bearing zones and freshwater aquifers.

Completion and Evaluation Operations

All frac fluid additives will meet BLM/EPA requirements for disposal of oil field wastes. All fluids utilized in the completion procedure will be contained on the well location in pits or tanks and disposed of in compliance with state and federal rules and regulations. Gases produced in association with completion and testing will be diverted to an unlined flare pit.

Fracturing fluids are to be blown into a flat tank until the flowback dries up and can be ignited. Once the flow can be ignited, it can be turned back to the flare pit. The fluids in the frac tank can be directed into the reserve pit after the condensate is separated off the top and shipped to production tanks.

Production Operations

All aboveground production facilities will be painted a standard environmental color (e.g., Carlsbad Canyon) that blends with the surrounding landscape, except for structures that require safety coloration to comply with Occupational Safety and Health Administration (OSHA) regulations.

All tank batteries will be fenced and bermed to contain 110% of the volume of the largest tank. Condensates will be removed from storage tanks on a periodic basis as needed and transported by truck for sale. Best available control technology (BACT) to reduce volatile organic compound (VOC) emissions from condensate storage tanks will be determined by WDEQ.

Water will be removed from the gas stream by the separators and dehydration and will be stored in a tank at each location, from which it periodically will be removed and disposed of in accordance with BLM/WOGCC/WDEQ rules and regulations. Produced water will be trucked to an approved disposal site (e.g., a well owned and operated by Enron Oil & Gas Company, Green River Bend #1, located in the SW¼NW¼ of Section 36, T27N, R113W) for underground disposal. The Jonah Federal 3-15 shut-in well (NE¼NW¼ of Section 15, T28N, R108W) or another appropriate wellbore may be converted for use as a disposal well, or a new disposal well may be drilled in the Jonah II Project Area to meet produced water disposal needs. Prior to such conversion or drilling, Operators will obtain approval from both the BLM and WOGCC in compliance with Onshore Oil and Gas Order Nos. 1, 2, and 7, as well as WOGCC Underground Injection Control rules and regulations (WOGCC Rule 405) governing the subsurface disposal of produced water.

Reclamation of areas unnecessary for production operations--approximately 1.8 acres at each well location--will be completed prior to freeze-up following termination of drilling and completion operations and a full drying season, thereby reducing surface disturbance at each location to 0.7 acres for the LOP. All disturbed surfaces will be reclaimed as soon as possible after initial disturbance. Reclamation will include backfilling the reserve pit, leveling and recontouring disturbed areas, redistribution of stockpiled topsoil over disturbed areas, and reseeding as recommended by the appropriate regulatory agency (BLM or WOGCC).

Reclamation of the reserve pit will occur when the pit is no longer required for completion

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and/or testing. Free-standing water in the pit will be evaporated prior to backfilling.

Pipelines

Industry standard pipeline equipment, materials, techniques, and procedures in conformance with all applicable regulatory requirements will be employed during construction, testing, operation, and maintenance of both gathering system and sales pipelines. Depending on the location of acceptable tie-ins, pipeline ROWs will be located adjacent to roads to the greatest extent possible to minimize surface disturbance and maximize construction and gas transport efficiency.

For large pipelines (>10 inches in diameter), sufficient topsoil (up to 12 inches) to facilitate reclamation will be removed and stockpiled from pipeline ROWs prior to ditching. On smaller pipelines, unless the pipeline route is on a steep sidehill, vegetation will be stripped to ground level using mechanical treatments that leave the topsoil intact and minimize disturbance to plant root systems, thereby facilitating vegetation reestablishment. Pipeline trenches generally will be 2 to 3 feet wide and located 8 to 10 feet outside of the road outslopes. All trenches will be backfilled as soon as possible and compacted. To facilitate compaction, no vegetation or snow will be in the trench during backfilling, and trenches will be wheel-rolled at least twice.

All pipeline ROW reclamation will be initiated as soon as practical following disturbance, but will be completed within a maximum of one year following completion of pipeline installation. Reclamation will be in accordance with the Reclamation Plan (Appendix B).

All pipelines will be tested with natural gas or water to ensure the integrity of newly constructed lines. Testing will consist of filling pipeline segments and pressurizing to levels exceeding operating pressures. If leaks or ruptures occur, they will be repaired and testing will be repeated until successful. Natural gas used for testing either will be returned to the gathering system for sales or vented to the surface in accordance with Notice to Lessees (NTL)-4A and/or WOGCC Rule 340. Fresh water also will be used for pipeline testing, and on completion of testing, this water will be discharged to existing drainages at rates less than the existing capacity of the affected drainages. The discharge of hydrostatic test water will be in accordance with BLM guidelines established during ROW permitting.

Gathering System

Natural gas will be transported in buried pipelines from each producing well location to the nearest existing gathering line. Gathering lines are anticipated to be 3 to 12 inches in diameter. Pipelines will follow roads to the greatest extent possible to minimize surface disturbance. The maximum width of gathering system pipeline ROWs will be 35 feet outside of and adjacent to road ROWs (50 feet total pipeline ROW width), and an average 0.4 mile of buried pipeline will be required per well.

Sales Pipelines

It is anticipated that an additional pipeline will be located within the existing pipeline corridor running southwest of the Jonah II Project Area, and buried and surface pipelines will be replaced in the existing corridor running north of the Jonah II Project Area.

Abandonment and Reclamation

As producing wells within the gas field become noncommercial, Operators will obtain the necessary authorizations from the appropriate regulatory agencies to abandon wells. All aboveground facilities will be removed, the wellbore will be physically plugged, buried pipelines will be purged, filled with a slurry or cement and abandoned in place, and both the

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abandoned road and well location will be reclaimed according to BLM and/or WOGCC recommendations and guidelines in the Reclamation Plan (Appendix D).

Ancillary Facilities

Compressors

Up to 12,000 hp of compression will be required to move the produced gas to market. The compressor stations will be situated and designed to minimize environmental impacts and maximize operational efficiency, and will require a maximum of 4.0 acres each for the LOP (16 acres maximum surface disturbance). Compressor engines will be fueled by natural gas and will be designed to minimize emissions based on WDEQ-Air Quality Division (AQD) review and subsequent requirements. A typical stack height will be 16 feet at a minimum.

Water Wells

Water wells will be drilled from natural gas well locations. They will be 600 to 700 feet deep, and approximately one well will be required per nine to 16 sections (10 total new water wells at 0.5 acre surface disturbance/well).

Geophysical Operations

Geophysical operations (i.e., seismic surveys), including 3-D surveys, velocity surveys, normal incident vertical seismic profiles, and/or offset vertical seismic profiles, may be required as drilling activity expands into portions of the Jonah II Project Area with marginal or unknown gas reserves. Surveys will be approved by the BLM prior to implementation using procedures specified in the Resource Management Plans for the BLM Pinedale Resource Area and BLM Green River Resource Area. Cultural resource inventories and other surveys for sensitive environmental resources will be conducted prior to implementation of geophysical operations as directed by the BLM.

Hazardous Materials

The Operators have reviewed the EPA's Consolidated List of Chemicals Subject to Reporting Under Title III of the Superfund Amendments and Reauthorization Act (SARA) of 1986 (as amended) to identify any hazardous substances proposed for production, use, storage, transport, or disposal by this project, as well as the EPA's List of Extremely Hazardous Substances as defined in 40 CFR 355 (as amended) and determined that numerous materials listed as hazardous and/or extremely hazardous will be used or generated by this project. This information is presented in Appendix C of the Draft EIS.

Operators and their contractors/subcontractors will comply with all applicable hazardous material laws and regulations and will locate, handle, and store hazardous substances in an appropriate manner to prevent contamination of sensitive resources. Any release of hazardous substances (leaks, spills, etc.) in excess of the reportable quantity as established by 40 CFR 117 will be reported as required by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, as amended. If the release of a hazardous substance in a reportable quantity does occur, a copy of the report will be supplied to the BLM and all other appropriate federal and state agencies.

Each Operator also will prepare, under separate cover in conjunction with this EIS, and implement the following plans and/or policies, copies of which will be available for review at the BLM Rock Springs District Office:

- Spill Prevention, Control, and Countermeasure Plans (SPCCPs) for sites which have storage volumes above threshold levels pursuant to 40 CFR 112;
- Spill Response Plans (oil/condensate);
- an inventory of hazardous chemical categories pursuant to Section 312 of SARA, as amended; and
- Emergency Response Plans.

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Mitigation/Environmental Protection Measures

The following mitigation measures, design features, and procedures will be implemented to minimize impacts to the environment. Exceptions to mitigation measures may be granted if a thorough analysis determines that the resource(s) for which the measure was developed will not be impacted by the proposed project. Further site-specific mitigation measures will be identified during APD and ROW application review processes.

To assure compliance with mitigation measures stipulated in this EIS and in APDs and ROW applications, each Operator will provide a single individual to consult with the BLM on construction/drilling operations during field development.

All of the mitigation/environmental protection measures identified in this section will be implemented on federally administered lands within the Jonah II Project Area, and these measures include all existing lease stipulations for the Jonah II Project Area. Development activities on all lands will be conducted in accordance with all appropriate federal, state, and county laws, rules, and regulations.

Preconstruction Planning and Design Measures

1. Implementation of site-specific projects will be contingent on BLM receiving, for approval/acceptance, the following plans:

   a. Surface Use Plan and/or Plan of Development; and

   b. Site-specific APD plans/reports (e.g., road and well pad design plans, cultural clearance, special status plant species clearance, etc.).

2. The BLM will conduct environmental reviews for each APD, ROW application, or Sundry Notice to identify final well or facility locations, access road alignments, and pipeline routes. Where practical, on-site visits will occur before Operator surveying. This will, through early identification of significant issues, minimize revisions and reduce or eliminate the need for additional site visits.

3. Approval of individual project components (i.e., wells, roads, pipelines, and ancillary facilities) will be contingent on completion and acceptance of a site-specific cultural resource literature search, Class III inventory report, and, as necessary, paleontological inventory; T&E, candidate, and sensitive species surveys; sage grouse lek clearance; raptor nest clearance; and any other clearance specified by the Authorized Officer (AO).

4. Operators will include discussion of site-specific mitigation and environmental protection measures in APD, ROW, or other appropriate permit applications, and a map showing specific locations where these measures will be implemented. Final locations for these measures will be confirmed by BLM and the Operators following on-site inspections of project locations.

Air Quality

1. Regular equipment maintenance, including emissions checks, and regular maintenance

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of roads will be conducted as necessary throughout the LOP.

2. Operators will water construction sites as necessary to control fugitive dust.

3. No open burning of garbage or refuse will be allowed at the well sites or other facilities. Any open burning will be conducted under the permitting provisions of Section 13 of the Wyoming Air Quality Standards and Regulations (WDEQ 1989).

4. All activities will comply with applicable local, state and Federal air quality laws, statutes, regulations, standards and implementation plans. Necessary air quality permits to construct, test, and operate facilities will be obtained from the WDEQ-AQD. All internal combustion equipment will be kept in good working order.

5. Operators will adhere to State of Wyoming-imposed regional NO_x or other air pollutant emission limits (i.e., levels of concern [BLM 1997a]) unless otherwise modified, as well as applicable Wyoming Ambient Air Quality Standards (WAAQS) and National Ambient Air Quality Standards (NAAQS).

6. Roads and well locations constructed on soils susceptible to wind erosion will be appropriately surfaced to reduce the amount of fugitive dust generated by traffic or other activities, and dust inhibitors (i.e., surfacing materials, non-saline dust suppressants, water) will be used as necessary on unpaved collector, local, and resource roads which p sent a fugitive dust problem. To further reduce fugitive dust, Operators will establish and enforce speed limits (15-30 mph) on all project-required roads in and adjacent to the Jonah II Project Area.

Topography and Physiography

1. Operators will incorporate in their Surface Use Plans and Plans of Development the procedures contained in *Standard Practices Applied to Surface Disturbing Activities* (BLM 1992b:Appendix 7-2), guidelines for road construction contained in BLM Manual 9113 (BLM 1985, 1991a) and the project transportation and reclamation plans (see Appendices A and B).

2. Unnecessary topographic alterations will be mitigated by avoiding, where possible, steep slopes, rugged topography, and perennial and ephemeral/intermittent drainages, and by minimizing the area disturbed.

3. Upon completion of construction and/or production activities, operators will restore the topography to near pre-existing contours at well sites, access roads, pipelines, and other facility sites.

Geological/Paleontological Resources

1. Wells, pipelines, and ancillary facilities will be designed and constructed such that they will not be damaged by moderate earthquakes. Any facilities defined as critical according to the Uniform Building Code will be constructed in accordance with applicable Uniform Building Code Standards for Seismic Risk Zone 2B.

2. In areas of paleontological sensitivity, a determination will be made by the BLM as to whether a survey by a qualified paleontologist is necessary prior to the disturbance. In some cases, construction monitoring, project relocation, data recovery, or other mitigation will be required to ensure that significant paleontological resources are avoided or recovered during construction.

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3. If paleontological resources are uncovered during surface disturbing activities, Operators will suspend all operations that will further disturb such materials and immediately contact the AO, who will arrange for a determination of significance, and, if necessary, recommend a recovery or avoidance plan. Mitigation of impacts to paleontological resources will be on a case-by-case basis, and Operators will either avoid or protect paleontological resources.

4. Construction workers will be instructed about the potential of encountering fossils in the Jonah II Project Area and the steps to take if fossils are discovered during project-related activities. The illegality of removing vertebrate fossil materials from federal lands without an appropriate permit will be explained.

Soils

1. Operators will adhere to the reclamation guidelines presented in Appendix B. Adverse impacts to soils will be mitigated by minimizing disturbance; avoiding construction with frozen soil materials; avoiding areas with high erosion potential (e.g., unstable soil, dunal areas, slopes greater than 25%, floodplains), where possible; salvaging and selectively handling topsoil from disturbed areas; adequately protecting stockpiled topsoil and replacing it on the surface during reclamation; leaving the soil intact (scalping only) during pipeline construction, where possible; using appropriate erosion and sedimentation control techniques including, but not limited to, diversion terraces, riprap, and matting; and promptly revegetating disturbed areas using adapted species. Temporary erosion control measures such as temporary vegetation cover; application of mulch, netting, or soil stabilizers; and/or construction of barriers may be used in some areas to minimize wind and water erosion and sedimentation prior to vegetation establishment. Specific measures and locations will be specified in Surface Use Plans or Plans of Development prepared during the APD and/or ROW application processes.

2. Pipeline ROWs will be located to minimize soil disturbance. Mitigation will include locating ROWs adjacent to access roads to minimize ROW disturbance widths, or routing pipeline ROWs directly to minimize disturbance lengths.

3. Appropriate erosion control and revegetation measures will be employed (see Appendix B). Grading and landscaping will be used to minimize slopes, and water bars will be installed on disturbed slopes in areas with unstable soils where seeding alone may not adequately control erosion. Erosion control efforts will be monitored by the BLM and Operators and augmented, as necessary, to control erosion.

4. Sufficient topsoil or other suitable material to facilitate revegetation will be segregated from subsoils during all construction operations requiring excavation and will be returned to the surface upon completion of operations. Soils compacted during construction will be ripped and tilled as necessary prior to reseeding. Cut and fill sections on all roads and along pipelines will be revegetated with native species.

5. Operators will revegetate all disturbed sites as soon as practical following disturbance (see Appendix B).

6. Any accidental soil contamination by spills of petroleum products or other hazardous materials will be cleaned up and the soil disposed of or rehabilitated as specified in

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the Operators' plan for spill prevention and control (SPCCP).

7. Operators will restrict off-road vehicle (ORV) activity by employees and contract workers.

8. Stabilized dunes will be avoided, where possible, to prevent reactivitaion of dunes. Areas necessarily disturbed will be seeded in the first appropriate season after disturbance. If deemed appropriate by the BLM AO, disturbed areas will be mulched or otherwise protected to prevent wind erosion and facilitate plant establishment.

9. The BLM will, as appropriate, require, as components of Surface Use Plans and/or Plans of Development, the inclusion of site-specific, predisturbance landscape characteristics, including soils, plant species composition, and plant cover data; and proposed reclamation seed mixes and application rates. In addition, special efforts to increase the likelihood of successful revegetation may include:

- the collection and analysis of soil samples from disturbed areas to determine appropriate reclamation seed mixtures and the need for soil amendments;
- the addition of fertilizers or other soil additives to improve soil texture and productivity;
- irrigation to improve germination and early growth; and/or
- topsoil stockpile seeding, mulching, or height reduction (to <3 feet) where topsoil is stockpiled for more than 3 months.

These measures will be applied as specified in APD and ROW application Surface Use Plans and/or Plans of Development. The BLM also will conduct quality assurance reviews to ensure compliance approved in APDs and ROWs.

10. The BLM will require Operators to avoid, where practical, Monte-Leckman complex, Huguston-Horsley-Terada complex, stabilized dune, and alkaline soils, where practical. In addition, the BLM will require Operators to restrict project-related travel on the Jonah II Project Area roads during periods when soils are saturated and rutting will occur.

11. Sandy soils associated with Sand Draw, Granite Wash, and Alkali Draw will be avoided if reasonably possible, except to cross the drainages at right angles, to minimize disturbance and possible erosion.

Water Resources

1. Operators will avoid disturbance within 500 feet of wetlands/riparian areas and open water areas and within 100 feet of ephemeral/intermittent drainages, where possible. If streams will be crossed by roads, culverts will be installed at all appropriate locations as specified in the BLM Manual 9112-Bridges and Major Culverts (BLM 1990a) and Manual 9113-Roads (BLM 1985). Streams will be crossed perpendicular to flow, where possible, and all stream crossing structures will be designed to carry the 25-year discharge event or other capacities as directed by the BLM.

2. All water used in association with this project will be obtained from groundwater wells approved by the Wyoming State Engineer's Office.

3. Guidelines specified in the Operators' SPCCPs will be adhered to such that any spill or accidental discharge of hazardous material will be remediated. An orientation will be conducted by the Operators to ensure that project personnel are aware of the potential impacts that can result from accidental spills and that they know the

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appropriate recourse if a spill occurs. Streams at pipeline crossings will be protected from contamination by pipeline breaks with shutoff valves or other systems capable of minimizing accidental discharge.

4. Erosion-prone (e.g., drainages) or high-salinity areas will be avoided where possible, and necessary construction in these areas will be done in the late summer, fall, and winter (prior to soil freezing) to avoid runoff periods. Proper containment of oil and produced water in tanks, drilling fluids in reserve pits, and the location of staging areas for storage of equipment away from drainages will prevent potential contaminants from entering surface waters.

5. Prudent use of erosion control measures, including diversion terraces, riprap, matting, temporary sediment traps, and water bars will be employed as necessary. Interceptor dikes will be used to control surface runoff generated at well locations, and dike location and construction methods will be described in APD and ROW plans. If necessary to reduce suspended sediment loads and remove potential contaminants, Operators will treat diverted water in detention ponds prior to release to meet applicable state or federal standards. If water is discharged into an established drainage channel, the rate of discharge will not exceed the capacity of the channel to convey the increased flow. Waters that do not meet applicable state or federal standards will be evaporated, treated, or disposed of at an approved disposal facility.

6. Operators will construct reserve pits with 2 feet of freeboard in cut areas or in compacted and stabilized fill. Subsoil material stability and permeability in the area of construction will be evaluated and the need for pit reinforcement assessed. The subsoil material at proposed pit locations will be inspected to assess soil stability and permeability and whether reinforcement and/or lining are required. Prior to installation of reserve pit liners and/or fluids, reserve pits will be inspected by BLM personnel. Earthen reserve pits will be used only after evaluation of the pit location for distance to surface waters, depth to useable groundwater, and soil type and permeability, and after evaluation of the fluids which will likely be retained in the pit.

7. If reserve pit leakage is detected, operations at the site will be curtailed, as directed by the BLM, until the leakage is corrected.

8. All wells will be cased and cemented to protect subsurface mineral and freshwater zones. Unproductive wells and wells that have completed their intended purpose will be properly abandoned and plugged using procedures identified by the Office of State Oil and Gas Supervisor, Rules and Regulations of WOGCC, and the BLM.

9. Channel crossings by pipelines will be constructed so that the pipe is buried at least 4 feet below the channel bottom.

10. Channel crossings by roads and pipelines will be constructed perpendicular to flow.

11. Disturbed channel beds will be reshaped to their approximate original configuration.

12. The disposal of all water (hydrostatic test water, stormwater, produced water) will be done in conformance with WDEQ-Water Quality Division (WQD) (WDEQ 1990a), BLM Onshore Oil and Gas Order No. 7, and WOGCC (WOGCC 1992) rules and regulations.

13. Operators will prepare plans for stormwater pollution prevention (SWPPPs) for all disturbances greater than 5 acres in size as

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required by WDEQ National Pollution Discharge Elimination System (NPDES) permit requirements. In some instances, SWPPPs for groups of wells will be developed.

14. Operators will implement plans for spill prevention and control (SPCCPs) if liquid petroleum products or other hazardous materials are stored on-site in sufficient quantities, in accordance with 40 CFR 112.

15. Any disturbances to wetlands and/or waters of the U.S. will be coordinated with the Corps of Engineers, and 404 permits will be secured as necessary prior to disturbance.

16. To mitigate potential impacts caused by flooding during the LOP, construction in flood-prone areas will be limited to late summer, fall, or winter when conditions are generally dry and streamflows are low or non-existent. Additional mitigation to lessen any impacts from flooding or high flows during and after construction will include the avoidance of areas with high erosion potential (i.e., steep slopes, floodplains, unstable soils); reestablishment of existing contours where possible; avoidance of areas within 500 feet of wetland edges, riparian areas, and open water, where possible; avoidance of areas within 100 feet of ephemeral drainages, where possible; and implementation of appropriate erosion and sediment control and revegetation procedures.

17. The Operators will cooperate with the BLM and the DEQ-WQD to minimize impacts to all quality-impaired waters. In addition, all reserve pits are to be lined unless otherwise approved. Drilling and/or fracturing fluids may be required to be hauled from locations and used for drilling or fracturing another well. The BLM also recommends that all fracturing fluids flowed-back to the surface be contained initially in tanks.

Noise

1. Noise mitigation will be applied at well locations, as determined necessary on a case-by-case basis by the BLM. All engines required for project activities will be properly muffled and maintained. Construction, drilling, completion, testing, and production facility installation activities will be seasonally restricted proximal to active raptor nests during the nesting period and in sage grouse breeding and nesting areas. Road use and travel pattern specifications designed, in part, to keep traffic to a minimum and to reduce noise impacts will be identified in the Transportation Plan (see Appendix A).

Vegetation

1. Operators will finance site-specific surveys for special status plant species prior to any surface disturbance in areas determined by the BLM to contain potential habitat for such species (BLM Manual 6840). These surveys will be completed by a qualified botanist as authorized by the BLM, and this botanist will be subject to BLM survey policy requirements for special status plant species. Data from these surveys will be provided to the BLM, and if any special status plant species or habitats are found, BLM recommendations for avoidance or mitigation will be implemented.

2. Herbicide applications will be kept at least 500 feet from known populations of special status plant species or other distance deemed safe by the AO.

3. Removal and disturbance of vegetation will be kept to a minimum through construction site management (e.g., using previously disturbed areas and existing easements, limiting equipment/materials storage yard and staging area size, etc.). Well locations

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and associated roads and pipelines will be located to avoid or minimize impacts in areas of high value (e.g., special status plant species habitats, wetland/riparian areas).

4. Proper erosion and sediment control structures and techniques will be incorporated by the Operators into the design of well pads, roads, pipelines, and other facilities. Revegetation using a BLM-approved, locally adapted seed mixture containing native grasses, forbs, and shrubs will begin in the first appropriate season following disturbance. Vegetation removed will be replaced with plants of equal forage value and growth form using procedures that include:

   - fall reseeding (September 15 to freeze-up), where feasible;
   - spring reseeding (prior to April 15) if fall seeding is not feasible;
   - deep ripping of compacted soils prior to reseeding;
   - surface pitting/roughening prior to reseeding;
   - utilization of native cool season grasses, fobs, and shrubs in the seed mix;
   - interseeding of shrubs into an established stand of grasses and fobs at least one year after seeding the grasses and fobs;
   - appropriate, approved weed control techniques;
   - broadcast or drill seeding, depending on site conditions; and
   - fencing of certain sensitive reclamation sites (e.g., riparian areas, steep slopes, and areas within 0.5 mile of livestock watering facilities) as determined necessary through monitoring.

5. Recontouring and seedbed preparation will occur immediately prior to reseeding on the unused portion of well locations and road ROWs and entire pipeline ROWs outside of road ROWs. In the event of uneconomical wells, Operators will initiate reclamation of the entire well location, access road, and adjacent disturbed habitat as soon as possible. Reclamation will be monitored by the Operators and the BLM, as specified in the Reclamation Plan (Appendix B), to determine and ensure successful establishment of vegetation.

6. Operators will monitor noxious weed occurrence on the project area and implement a noxious weed control program in cooperation with the BLM and Sublette County to ensure noxious weed invasion does not become a problem. Weed-free certification by county extension agents will be required for grain or straw used for mulching revegetated areas. Gravel and other surfacing materials used for the project will be free of noxious weeds.

7. Operators will evaluate all project facility sites for occurrence of waters of the U.S., special aquatic sites, and wetlands, in accordance with Corps of Engineer requirements. All project activities will be located outside of these sensitive areas, where practical.

8. Where wetlands, riparian areas, streams, and ephemeral/intermittent stream channels must be disturbed, Corps of Engineers Section 404 permits will be obtained as necessary, and the following measures will be employed:

   - Wetland areas will be crossed during dry conditions (i.e., late summer, fall, or dry winters); winter construction activities will occur only prior to soil freezing or after soils have thawed.
   - Streambeds will be crossed perpendicular to flow.
   - Streams, wetlands, and riparian areas disturbed during project construction will be restored to as near pre-project conditions as practical, and if impermeable soils contributed to wetland formation, soils will

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be compacted to reestablish impermeability.
- Wetland topsoil will be selectively handled.
- Areas will be recontoured and BLM-approved species will be used for reclamation.
- Reclamation activities will begin on disturbed wetland areas immediately after completion of project activities.

9. Vehicular traffic and parking is limited, unless specifically authorized otherwise, to the running surface of the road and the designated well locations as approved in APDs and ROWs. In addition, traffic will be restricted on two-tracks when soils are saturated and rutting would occur.

10. The BLM and Operators will monitor reclaimed areas to assure successful reclamation is obtained.

Wildlife and Fisheries

1. The Operators, in consultation with representatives from BLM, WGFD, USFWS, and other interested groups such as area livestock operators, will adhere to the Wildlife Monitoring/Protection Plan for this project (see Appendix D). The plan will be incorporated into the Operators' field operations manual or handbook, a copy of which will be kept on-site and in the BLM Pinedale and Rock Springs Offices.

2. To minimize wildlife mortality due to vehicle collisions, Operators will advise project personnel of appropriate speed limits in the project area, and roads will be reclaimed as soon as possible after they are no longer required. Some existing roads in the project area may be closed and reclaimed by the Operator as directed by the BLM. Potential increases in poaching will be minimized through employee and contractor education regarding wildlife laws. If violations are discovered, the offending employee or contractor will be disciplined and may be dismissed by the Operators, and/or prosecuted by the WGFD.

3. Operators will comply with the following guidelines for avoidance of raptor nests and sage grouse leks and nesting areas:

Raptors

- Well locations, pipelines, and associated roads will be selected and designed to avoid disturbances to areas of high wildlife value (e.g., raptor nest sites, wetland areas).

- Raptor nest surveys will be conducted within a 0.5- to 1.0-mile radius of proposed surface use or activity areas if such activities are proposed to be conducted between February 1 and July 31.

- All surface-disturbing activity (e.g., road, pipeline, well pad construction, drilling, completion, workover operations) will be seasonally restricted from February 1 through July 31 within a 0.5-mile radius of all active raptor nests, except ferruginous hawk nests, for which the seasonal buffer will be 1.0 mile. (An active raptor nest is defined as a nest that has been occupied within the past 3 years.) The seasonal buffer distance and exclusion dates applicable may vary depending on such factors as the activity status of the nest, species involved, prey availability, natural topographic barriers, line-of-site distance(s), and other conflicting issues such as cultural values, steep slopes, etc.

- Well locations, roads, ancillary facilities, and other surface structures requiring repeated human presence will not be constructed within 825 feet (2,000 feet for bald eagles) of active raptor nests, where practical.

Sage Grouse

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- Surface disturbance within 0.25 mile of a sage grouse lek will be avoided.

- Permanent, high profile structures such as buildings and storage tanks will not be constructed within 0.25 mile of a lek. This buffer may be expanded on a case-by-case basis.

- Operators will restrict construction activities between March 1 and June 30 within a 2.0-mile radius of active sage grouse leks on suitable sage grouse nesting habitat as determined during on-site reviews of proposed development areas.

- If an active sage grouse nest is identified in an area proposed for disturbance, surface-disturbing activities will be delayed in the area until nesting is completed.

- Field evaluations for sage grouse leks will be conducted by a qualified biologist prior to the start of activities in potential sage grouse habitat. These field evaluations for leks will be conducted if project activities are planned in potential sage grouse habitat between February 1 and July 31. BLM wildlife biologists will ensure that such surveys are conducted using proper survey methods.

4. Wildlife-proof fencing will be utilized on reclaimed areas if it is determined that wildlife species are impeding successful vegetation establishment.

5. ROW fencing associated with this project will be kept to a minimum and, if necessary, fences will consist of four-strand barbed wire meeting WGFD approval for facilitating wildlife movement.

6. Reserve and workover pits potentially hazardous to wildlife will be adequately protected (e.g., fencing, netting) to prohibit wildlife access as directed by the BLM.

7. USFWS and WGFD consultation and coordination will be conducted for all mitigation activities relating to raptors and T&E species and their habitats, and all permits required for movement, removal, and/or establishment of raptor nests will be obtained.

8. Operators will implement policies designed to control poaching and littering and will notify all employees (contract and company) that conviction of a major game violation could result in disciplinary action. Contractors will be informed that any intentional poaching or littering within the project area could result in dismissal.

9. Firearms and dogs will not be allowed on-site during working hours. Operators have existing drug, alcohol, and firearms policies that will be internally enforced.

10. Surveys for T&E and candidate wildlife species will be implemented in areas of potential habitat by a qualified biologist prior to disturbance. Findings will be reviewed by the BLM prior to or as components of ROW applications and APD review processes. If T&E and/or candidate species are found in the area, consultation with the USFWS will be initiated, and construction activities will be curtailed until there is concurrence between BLM, USFWS, and the Operator on what activities can be authorized.

11. Operators will adhere to all survey, mitigation, and monitoring requirements identified in the Biological Assessment (BA) for this project.

12. No surface water or shallow groundwater in connection with surface water will be utilized for the proposed project.

13. Mountain plover surveys will be conducted within suitable plover habitat on the Jonah II

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Project Area by a qualified biologist in accordance with USFWS guidelines. The survey procedures will include the following:

- Visual observation of the area within 0.25 mile of proposed well locations and 300 feet of proposed access routes will be made to detect the presence of plovers. All plovers located will be observed long enough to determine if a nest is present.

- Surveys will be conducted no more than 14 days prior to the date actual ground-disturbance activities begin. If two surveys are required, they will be made at least 14 days apart, with the last survey no more than 14 days prior to the start-up date.

- The number of surveys required to clear a site for mountain plovers prior to beginning a planned activity depends on the start-up date, as shown below:

Date of Planned Activity	# Surveys Required
March 15 - April 15	1
April 15 - July 15	2
July 15 - August 15	1

- If an active plover nest is found in the survey area, the planned activity will be delayed at least 30 days. If a brood is observed, activities will be delayed at least seven days.

14. Proposed construction sites not examined for prairie dogs during past surveys will be examined prior to surface disturbing activities to confirm the presence or absence of prairie dog colonies. Confirmation will be made of white-tailed prairie dog colony/complex size, burrow density, and any other data indicating whether the criteria established in the USFWS (1989a) guidelines for black-footed ferret habitat are met. If prairie dog colonies are found, a qualified biologist will locate all project components to avoid direct impacts to the colony. If this is not practical, black-footed ferret surveys of prairie dog colonies, where required by the USFWS, will be conducted in accordance with USFWS guidelines and requirements. This information will be provided to the USFWS in accordance with Section 7 of the ESA, as amended, and the Interagency Cooperation Regulations.

15. If nests of loggerhead shrike are found within 0.5 mile of a well pad or access road during on-site inspection or during other clearance surveys, avoidance of the nest site will be accomplished in consultation and coordination with the USFWS and BLM.

16. Additional water sources (e.g., retention of project-developed water wells) may be voluntarily developed by the Operators in the Jonah II Project Area to increase seasonal use of the area by pronghorn and sage grouse, or to hold pronghorn on the Jonah II Project Area for longer periods during seasonal movements in order to reduce foraging pressure on crucial winter habitats, as deemed appropriate by the BLM in consultation with the WGFD.

17. Inventory and monitoring of wildlife on the Jonah II Project Area will be conducted as specified in the Wildlife Monitoring/Protection Plan (Appendix D), and appropriate management decisions will be made to further protect wildlife and their habitats.

18. All potential habitat for Cedar Rim thistle will be surveyed prior to disturbance. This habitat includes barren slopes, fans, and draws on whitish-gray sandstone, chalk, tufaceous colluvium, or clay substrates.

Livestock/Grazing Management

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1. Reclamation of nonessential areas disturbed during construction activities will be accomplished in the first appropriate season after well completion. Nonessential areas include portions of the well locations not needed for production operations, the borrow ditch and outslope portions of new road ROWs, entire pipeline ROWs outside of road ROWs, and all roads and associated disturbed areas at nonproductive well locations. Operators will repair or replace fences, cattleguards, gates, drift fences, and natural barriers to maintain current BLM standards. Cattleguards will be used instead of gates for livestock control on most road ROWs. Livestock will be protected from pipeline trenches, and livestock access to existing water sources will be maintained.

2. The BLM, Operators, and livestock permittees will monitor livestock movements, especially regarding any impacts from roads or disturbance from construction and drilling activities. Appropriate measures will be taken to correct any adverse impacts, should they occur.

3. Fencing will be used to keep livestock away from all pits containing fluids. This will avoid conflicts with livestock drinking contaminated water.

Cultural Resources

1. Operators will follow the Section 106 compliance process prior to any surface-disturbing activity and will either avoid or protect cultural resource properties.

2. Operators will halt construction activities if previously undetected cultural resource properties are discovered during construction. The BLM will be notified immediately, and consultation with the Wyoming State Historic Preservation Office (SHPO) and Advisory Council will be initiated to determine proper mitigation measures pursuant to 36 CFR 800.11 or other treatment plans, programmatic agreements, or discovery plans that may direct such efforts. Construction will not resume until a Notice to Proceed is issued by the BLM.

3. If sensitive cultural resources, or areas of religious importance, traditional cultural properties, or other sensitive Native American areas are identified in affected areas, BLM, affected tribes, and the Operators will identify potential impacts and determine appropriate mitigative treatments including conditioned surface use stipulations, on a case-by-case basis.

4. Energy development of the Jonah II Project Area potentially could create adverse effects to NRHP eligible cultural resources. The primary tool for the mitigation of the adverse effect is avoidance, either by project redesign or relocation. This strategy is proposed for all recognized eligible sites, areas of Native American concern, and other recognized sensitive areas, specifically Sand Draw. However, avoidance will not always be possible.

5. Adverse project effects that cannot be eliminated via avoidance will be mitigated either on a case-by-case basis via pre-established methods. For prehistoric sites whose importance is derived because of the data they contain, mitigation usually takes the form of data recovery via excavation. Unexpected discoveries will be handled on a case-by-case basis but salvage excavation of impacted materials will normally be required.

6. The standard mitigation of potential effects to traditional cultural properties and areas considered sensitive to Native Americans usually is avoidance. The specifics of avoidance (distances, buffers) is determined subsequent to consultation.

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7. The Operators and BLM will initiate an educational program to inform Jonah II Project Area employees and visitors about regulations concerning cultural resource management and artifact collection. Interpretive and informative signing will be implemented at the major road access points entering the Jonah II Project Area.

8. Construction in archaeologically sensitive areas during frozen ground conditions will be prohibited. Construction operations will be planned to take advantage of the summer and fall construction windows, such that drilling will occur during winter.

9. Mitigation of effects to significant historic period cultural resources will be determined subsequent to consultation, recognizing the applicable significance criteria (36 CFR 60.4 [a] to [d]).

10. Programmatic agreements, discovery plans, and/or individual project treatment plans will be developed to reduce impacts on cultural sites, if the operators are willing to participate.

11. Geoarchaeological studies may be incorporated into these plans where appropriate.

12. BLM will increase law enforcement presence in the area to deter unauthorized collection of cultural materials.

13. All development except for road and pipeline crossings, within 300 feet of the edge of the drainage channels of Sand Draw, Granite Wash, and Alkali Draw is prohibited. Access to, occupancy, and use of areas with sensitive cultural resources and /or sensitive Native American concerns may be prohibited where adequate mitigation is not otherwise possible. Areas with sensitive cultural resources and /or sensitive to Native Americans will be managed with these values in mind.

Socioeconomics

1. Operators will encourage the use of local or regional workers.

2. Operators will schedule concentrations of project traffic, such as truck convoys or heavy traffic flows, to avoid periods of expected heavy traffic flows associated with recreation. Travel and parking will be restricted to access roads and on-site parking areas.

3. The BLM will encourage Operators to plan proposed development operations such that seasonal restrictions do not impact the associated workforce.

Land Status/Use/Prior Rights

1. Mitigation to prior rights will include:

- limiting drilling operations to lands leased or owned by the Operators;
- locating wells away from known underground cables;
- regrading and repairing roads, as necessary, in areas damaged by project activities;
- reestablishing a level, compacted surface where pipelines cross existing roads;
- advance identification and flagging of all existing ROWs that will be crossed by proposed pipelines and roads;
- backhoe and hand excavation at pipeline crossings until the exact locations of existing underground lines have been determined; and
- restoring native vegetation as soon as practical.

2. Roads and pipelines will be located adjacent to existing linear facilities wherever practical.

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3. Where proposed roads will follow existing roads, those portions of existing roads not included in the new road ROW and not needed by other area users will be reclaimed and revegetated by the Operators following Class III cultural resource surveys. In addition, the BLM will require the construction of adequate turnouts on new crowned-and-ditched roads to provide access from these new roads to existing two-tracks and other undeveloped roads.

Recreation

1. Operators will post appropriate warning signs and require project vehicles to adhere to appropriate speed limits on project-required roads.

2. Operators will inform their employees, contractors, and subcontractors that long-term camping (greater than 14 days) on federal lands or at federal recreation sites is prohibited.

3. Operators will direct their employees, contractors, and subcontractors to abide by all state and federal laws and regulations regarding hunting.

Visual Resources

1. Operators will utilize existing topography to screen roads, pipeline corridors, drill rigs, wells, and production facilities from view, where practical.

2. Operators will paint all aboveground production facilities with appropriate colors (e.g., Carlsbad Canyon) to blend with adjacent terrain, except for structures that require safety coloration in accordance with OSHA requirements.

Transportation

1. Detailed practices and procedures as specified in the Transportation Plan for this project will be followed (Appendix A). Annual transportation plans will be developed and will identify the minimum road network required to support annually proposed project activities, as well as construction and maintenance responsibilities of the Operators. Annual plans also will identify road-specific dust abatement, road construction, and surfacing requirements.

2. Existing roads will be used to the maximum extent possible and upgraded as necessary.

3. All roads not required for routine operation and maintenance of producing wells or ancillary facilities will be reclaimed as directed by the BLM, State Land Board, or private landowner. These roads will be permanently blocked, recontoured, reclaimed, and revegetated by the Operators, as will disturbed areas associated with permanently plugged and abandoned wells.

4. Site-specific centerline survey and construction designs will be submitted to and approved by the BLM prior to road construction.

5. Operators will comply with existing federal, state, and county requirements and restrictions to protect road networks and the traveling public.

6. Special arrangements will be made with the Wyoming Department of Transportaion to transport oversize loads to the project area. Otherwise, load limits will be observed at all times to prevent damage to existing road surfaces.

7. All development activities along approved ROWs will be restricted to areas authorized in the approved ROW.

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8. Available topsoil will be stripped from all road corridors prior to commencement of construction activities and will be redistributed and reseeded on backslope areas of the borrow ditch after completion of road construction activities. Borrow ditches will be reseeded in the first appropriate season after initial disturbance.

9. Operators will comply with existing federal, state, and county requirements and restrictions developed to protect road networks and the traveling public. Special arrangements will be made with the Wyoming Department of Transportation, as required, to transport oversize and/or overweight loads to the project area. The transportation planning process for this project is described in Appendix A.

Health and Safety/Hazardous Materials

1. Operators will utilize DEQ-approved portable sanitation facilities at drill sites and workovers lasting more than 3 days.

2. Operators will place warning signs near hazardous areas and along roadways.

3. Operators will place dumpsters at each construction site to collect and store garbage and refuse.

4. Operators will ensure that all refuse and garbage is transported to a State-approved sanitary landfill for disposal.

5. Operators will institute a Hazard Communication Program for its employees and will require subcontractor programs in accordance with OSHA (29 CFR 1910.1200).

6. In accordance with 29 CFR 1910.1200, a Material Safety Data Sheet for every chemical or hazardous material brought on-site will be kept on file at the Operator's field office.

7. Plans for spill prevention, control, and countermeasure (SPCCPs) will be written and implemented in accordance with 40 CFR 112.

8. Chemical and hazardous materials will be inventoried and reported in accordance with the SARA Title III (40 CFR 335). If quantities exceeding 10,000 pounds or the threshold planning quantity are to be produced or stored, the appropriate Section 311 and 312 forms will be submitted at the required times to the State and County Emergency Management Coordinators and the local fire departments.

9. Any hazardous wastes, as defined by the Resource Conservation and Recovery Act of 1976 (RCRA), as amended, will be transported and/or disposed of in accordance with all applicable federal, state, and local regulations.

10. Operators will adhere to existing internal health and safety policies and procedures (MOC 1992; SOCO 1992, n.d.; Amoco 1993, 1995; WGR n.d.).

11. All storage tank batteries, drain sumps, and sludge holdings at compressor facilities installed on location and designed to contain any oil, glycol, produced water, or other fluid which may constitute a hazard to public health or safety would be surrounded by a secondary means of containment for the entire contents of the largest single tank in use plus one foot of freeboard for precipitation or 110% of the capacity of the largest vessel. The appropriate containment and/or diversionary structures or equipment, including walls and floor, to prevent discharged fluid from reaching groundwater, surface water, or navigable waters, would be

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impervious to any oil, glycol, produced water, or other fluid for 72 hours and would be constructed so that any discharge from a primary containment system, such as a tank or pipe, would not drain, infiltrate, or otherwise escape to groundwater, surface water, or navigable waters before cleanup is completed.

Treaters, dehydrators, and other production facilities installed on locations that have the potential to leak or spill oil, glycol, produced water, or other fluid which may constitute a hazard to public health or safety, would be placed on or within appropriate containment and/or diversionary structure to prevent spilled or leaking fluid from reaching groundwater, surface water, or navigable waters. The appropriate containment and/or diversionary structure would be sufficiently impervious to oil, glycol, produced water, or other fluid and would be installed so that any spill or leakage would not drain, infiltrate, or otherwise escape to groundwater, surface water, or navigable waters before cleanup is completed.

Compliance with Authorizations

The Operators, either individually or collectively, are required to provide a person to be the primary point of contact for a BLM Jonah II project manager. Both are to be named by June 17, 1998.

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APPENDIX D:
WILDLIFE MONITORING/PROTECTION PLAN

WILDLIFE MONITORING/PROTECTION PLAN
FOR THE JONAH FIELD II
NATURAL GAS DEVELOPMENT PROJECT

Prepared for

Pinedale Resource Area
and
Green River Resource Area
Rock Springs District
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By

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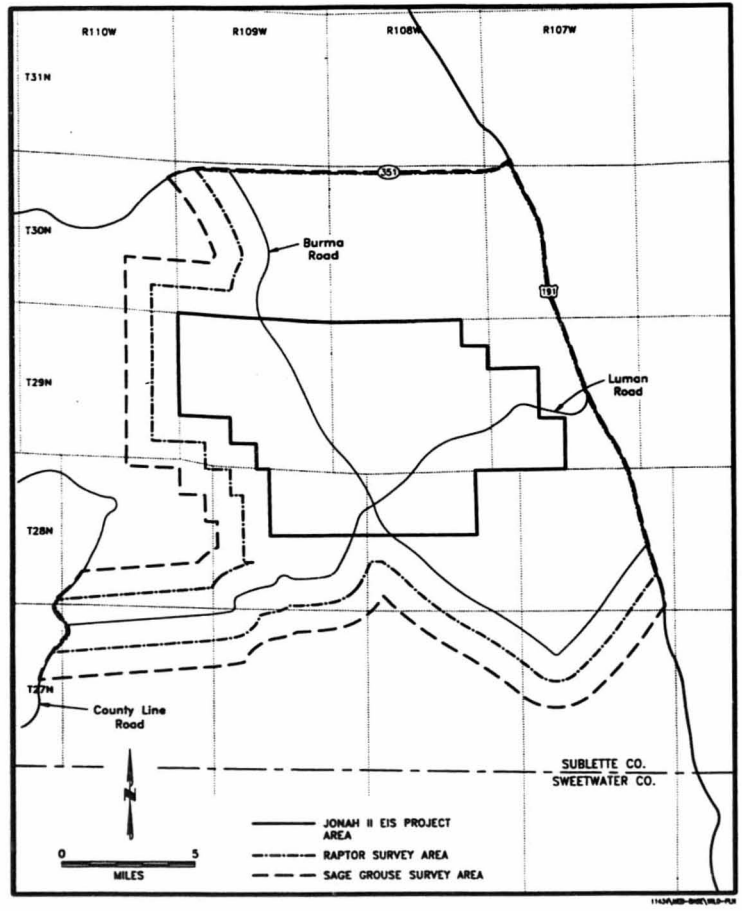
D-1.0 INTRODUCTION

This wildlife monitoring/protection plan was prepared in conjunction with the environmental impact statement (EIS) for the Jonah Field II Natural Gas Development Project, Sublette County, Wyoming. The goals of the plan are to monitor wildlife population trends on the Jonah Field II project area (J2PA) during the course of project development and operations and to avoid and/or minimize adverse impacts to wildlife present on project-affected areas. Map D-1.1 shows the location of the J2PA and associated wildlife monitoring areas. Implementation of the plan would allow land managers and project personnel opportunities to achieve and maintain desired levels of wildlife productivity and populations on the J2PA (e.g., pre-project levels) by minimizing and/or avoiding potential adverse impacts to wildlife species. In addition, the implementation of this plan would facilitate the maintenance of a diverse assemblage of wildlife populations on the J2PA simultaneous with the development of natural gas reserves.

The proposed Jonah Field II natural gas project involves the development of a maximum of 450 new well locations and associated facilities (roads, pipelines, compressor stations) on the J2PA over the next 10-15 years. The proposed life-of-project (LOP) is estimated to be from 40 to 50 years. Alternative development strategies have been proposed (i.e., Proposed Action, Maximum Well Density Alternative, Sensitive Resource Area Alternative, No Action). A complete description of the proposed project and alternatives is provided in Chapter 2.0 of the Jonah Field II EIS.

Proposed inventory, monitoring, and protection measures would be implemented under each potential development scenario (i.e., alternative), unless information revealed in the coordinated review of annual wildlife reports (see Section D-2.1.1) indicates these measures are unnecessary for wildlife protection. This wildlife plan would not be implemented under the No Action Alternative.

Implementation of the plan would began in 1997 and will continue for five years. However, the plan may be terminated at the end of any year when there is sufficient evidence that project-related impacts to wildlife populations and productivity in the J2PA have been successfully mitigated and, therefore, are negligible.



Map D-1.1 Wildlife Survey Areas, Jonah II Natural Gas Project, 1997.

D-2.0 IMPLEMENTATION PROTOCOL

This section provides preliminary wildlife inventory, monitoring, and protection protocol. Alternative protocols likely would be developed in the future in response to specific needs identified in annual wildlife reports (see Section D-2.1.1). Methods are provided for each wildlife species/category. The wildlife species/categories for which specific inventory, monitoring, and protection procedures would be applied were developed based on management agency (i.e., U.S. Bureau of Land Management [BLM], U.S. Fish and Wildlife Service [USFWS], Wyoming Game and Fish Department [WGFD]) and individual concerns identified during the preparation of the EIS (see EIS Section 1.4).

D-2.1 ANNUAL REPORTS AND MEETINGS

D-2.1.1 Reports

During the first five years of project development, Operators (i.e, McMurry Oil Company, Snyder Oil Corporation, Amoco Production Company, Western Gas Resources) would provide an annual inventory and description of all existing project features (i.e., location, size, and associated level of human activity at each feature), as well as those tentatively proposed for development within the next 12 months. This inventory would be coupled with annual wildlife inventory, monitoring, and protection data obtained for the previous year and included in annual reports. Annual reports would be prepared by an Operator-financed and BLM-approved biologist. When annual wildlife inventory, monitoring, and protection data are gathered by parties other than the Operator biologist, those parties (e.g., BLM, WGFD) would provide the data to the Operator biologist by October 15 of each calendar year. Upon receipt of these data, annual reports would be completed in draft form by the Operator-financed biologist and submitted to BLM, USFWS, and WGFD by November 15. A meeting of the aforementioned parties would be held in early December of each year to discuss and modify, as necessary, proposed wildlife inventory, monitoring, and protection protocol for the subsequent year. A final annual report would be issued by the Operators to all potentially affected individuals and groups by early February of each year. The first annual report would be submitted in early 1998.

Annual reports would summarize annual wildlife inventory and monitoring results, note any trends across years, identify and assess protection measures implemented during past years, specify protection measures proposed for the upcoming year, and recommend modifications to the existing wildlife monitoring/protection plan based on the successes and/or failures of past years. In addition, sources of potential disturbance to wildlife would be identified, where practical (e.g., development activities, weather conditions, etc.). Tables D-2.1 through D-2.4 provide examples for the presentation of data within annual reports. Raw data collected each year would also be provided to management agencies (e.g., BLM, WGFD, USFWS, Wyoming Natural Diversity Database) at the request of these agencies. Annual reports would be prepared during the first five years of project development. After this five-year period, this plan would be reviewed by the BLM in consultation with the USFWS, WGFD, and Operators and would be updated and modified as necessary.

Additional reports may be prepared in any year, as necessary, to comply with other relevant wildlife laws, rules, and regulations (e.g., black-footed ferret survey reports [see Section D-2.3.2.1]).

D-2.1.2 Meetings

Meetings would be held as necessary in any given year by the Operators, WGFD, USFWS, and/or BLM in Pinedale to inform and update Operator personnel on the findings of the annual reports. Relevant wildlife laws, rules, and regulations also may be discussed, as would project-specific wildlife monitoring and protection management protocol for the upcoming year. Additional information on the nature of the wildlife present on the J2PA, potential impacts to wildlife, appropriate Operator responses to wildlife encounters to avoid or minimize impacts, and other items (e.g., species identification) may be presented at these meetings as deemed necessary and specified in annual reports.

D-2.2 ANNUAL INVENTORY AND MONITORING

Inventory and monitoring protocol would be as identified below for each wildlife species/category.

Table D-2.1 Summary of Raptor Nest Data, Jonah II Natural Gas Project, 1997.

Nest No.	Legal Location	Status	Condition	Species (if active)	Buffer Radius	# Eggs	# Nestlings	# Fledglings	Comments (e.g., Distance to Disturbance, Potential Impacts, Mitigation)

Table D-2.2 Summary of Observations of Threatened, Endangered, Candidate, and Other Species of Concern, Jonah II Natural Gas Project, 1997.

Species	Total # Obs.	Habitat Type[1]					Comments (suitable habitat, nests, etc.)	Potential Impacts/Mitigation
		BS	CP	SB	DS	P/R		

[1] Indicates presence/absence.

BS = Big sagebrush
CP = Cushion plant
SB = Saltbush
DS = Disturbed
P/R = Pond/riparian

Table D-2.3 Summary of Sage Grouse Lek Data, Jonah II Natural Gas Project, 1997.

Lek No.	Legal Location	Date	Status	# Males	# Females	Distance to Disturbance/Potential Impacts/Mitigation

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Table D-2.4 Summary of General Wildlife Observations, Jonah II Natural Gas Project, 1997.

Species			Habitat Type[1]					No. of Obs. by Season[2]			
Common Name	Scientific Name	No. of Obs.	BS	CP	SB	DS	P/R	Winter	Spring	Summer	Fall
Mammals											
Total											
Birds											
Total											
Reptiles/Amphibians											
Total											
Grand Total											

[1] Indicates presence/absence.

BS = Big sagebrush
CP = Cushion plant
SB = Saltbush
DS = Disturbed
P/R = Pond/riparian

[2] Seasons are defined as follows:

Winter = November-March
Spring = April-May
Summer = June-August
Fall = September-October

These protocol would be unchanged across development alternatives, except as authorized by the BLM. Additional surveys may be added or surveys may be omitted in future years, pending results presented in the coordinated review of annual reports. Opportunistic wildlife observations would be made throughout the year by agency and Operator personnel present on the J2PA.

D-2.2.1 Raptors

A raptor inventory of potentially affected areas (see Map D-1.1) would be conducted in April/May of 1997 to determine the location of raptor nests/territories and their activity status by an Operator-financed, BLM-approved biologist. This survey may be implemented aerially (e.g., via helicopter) or from the ground. Data collected during the survey would be recorded on Raptor Nesting Record, Raptor Observation Data Sheets, or other similar data forms (see Addendum D-A).

Additional nest productivity monitoring would occur in successive years at nests/nesting territories that are located within 1 mi of project-required disturbance areas that require repeated human presence. Productivity surveys in potentially affected areas would be conducted between March 1 and mid-July to determine nesting success (i.e., number of nestlings/fledglings). These surveys would be conducted from the ground, and attempts would be made to determine the cause, if any, of documented nest failure. Site-specific raptor nest inventories also would continue to be conducted in association with Application for Permit to Drill (APD) and Right-of-way (ROW) application field reviews.

During the first few years of survey, the approximate boundary of each raptor pair's nesting territory would be defined, if possible, and where productivity monitoring is required, it would be conducted on the nesting territory. In addition, attempts would be made to determine the general foraging territories for raptor pairs. This information is important for determining potential locations for artificial nesting structures (ANSs), if these structures are proposed for use as a protection measure (see Section D-2.3.1).

All raptor nest/productivity surveys would be conducted using procedures that minimize potential adverse effects to nesting raptors. Specific survey measures for reducing detrimental effects are listed in Call (1978) and Grier and Fyfe (1987) and include the following.

- Nest visits would be conducted as late as possible in the nesting season.
- Nests would be approached cautiously and their status (i.e., number of nestlings/ fledglings) determined from a distance with binoculars or a spotting scope.
- Nests would be approached tangentially and in an obvious manner to avoid startling adults.
- Nests would not be visited during adverse weather conditions (e.g., extreme cold, precipitation events, windy periods, hottest part of the day).
- Visits would be kept as brief as possible and, in no instance, would be greater than 10 minutes.
- All inventories would be coordinated with management agencies.
- The number of nest visits in any year would be kept to a minimum.
- All raptor nest location data would be kept confidential, and would be available for review by interested parties only as deemed appropriate by the BLM.

D-2.2.2 Threatened, Endangered, Candidate, and Other Wyoming Species of Concern

The level of inventory/monitoring required for threatened, endangered, candidate, and other Wyoming species of concern (TEC&WSC) would be commensurate with established protocol for the potentially affected species. Survey protocol developed in conjunction with the Biological Assessment for this project (see EIS, Appendix E) would be conducted as a component of this Wildlife Monitoring/Protection Plan. Methodologies and results of these surveys would be included in annual reports or provided in separate supplemental reports. Additionally, as TEC&WSC species are added to or withdrawn from USFWS, BLM, and WGFD lists, appropriate modifications would be incorporated into this plan and specified in annual reports.

TEC&WSC data collected during the surveys described below would be considered confidential and would be provided only as necessary to those requiring the data for specific management and/or project development needs. Other interested parties would have the opportunity to review these data only

as deemed appropriate by the BLM. Data would be collected on appropriate General Wildlife Observation Data Sheets or other similar forms (see Addendum D-A). Alternate/additional forms may be used as specified by the BLM.

D-2.2.2.1 Black-footed Ferret

Prairie dog colonies (i.e., black-footed ferret habitat) on the J2PA were mapped and burrow densities determined in spring 1996, and most prairie dog colonies on the area have sufficient burrow densities (i.e., > 8 burrows/acre) to warrant black-footed ferret surveys prior to disturbance (Anderson 1996). Additional prairie dog colonies encountered on the J2PA would be mapped and burrow densities calculated by the BLM. Colonies that meet USFWS criteria as black-footed ferret habitat (USFWS 1989a) would be surveyed for black-footed ferrets by an Operator-financed, USFWS-certified surveyor prior to BLM authorizing disturbance of these colonies. Black-footed ferret surveys would be conducted in accordance with USFWS guidelines (USFWS 1989a) and would be conducted on a site-specific basis, depending on the areas proposed for disturbance in a given year as specified in the annual report.

D-2.2.2.2 Bald Eagle, Peregrine Falcon, Ferruginous Hawk, and Golden Eagle

Inventory and monitoring protocol for bald eagle, peregrine falcon, ferruginous hawk, and golden eagle would be as described for raptors (see Section D-2.2.1).

D-2.2.2.3 Mountain Plover

Suitable mountain plover habitat (i.e., areas with vegetation less than 6 inches in height) within 0.25 mi of proposed well locations or 300 ft of proposed roads (as identified in annual wildlife reports) would be surveyed prior to disturbance by the BLM to detect the presence of plovers. Surveys would be conducted on these areas between March 15 and August 15. If plovers are not found, no additional surveys would be conducted. If plovers are discovered, observations would continue for sufficient duration to determine if mountain plover nests are present. If no nesting is discovered, no additional surveys would be conducted. If nesting is discovered on the area, surveys would be conducted on and within 0.25 mi of areas proposed for development between March 15 and July 15 no more than 14 days prior to the date that ground-disturbing activities are initiated. If development is proposed for the period of March 15 through April 15 or July 15 through August 15, a single survey would be required; however, if ground-disturbing activities are proposed for the period of April 15 through July 15, two surveys would be required. If two surveys are required, these surveys would be made at least 14 days apart, with the last survey no more than 14 days prior to the initiation of ground-disturbing activities.

D-2.2.2.4 Western Burrowing Owl

Prairie dog colonies and other buitable nesting habitats on and within 0.5 mi of existing and proposed disturbance areas would be searched annually for western burrowing owls by the BLM during June and July to determine the extent of owl nesting on and in the vicinity of the J2PA. The number of active nest burrows on the J2PA would be identified each year. Efforts would be made to determine reproductive success.

D-2.2.2.5 Other TEC&WSC Species

Surveys for other TEC&WSC species would be conducted by the BLM in areas of potential habitat within 0.5 mi of proposed disturbance sites prior to disturbance. These surveys may be implemented in conjunction with surveys for other species or as components of APD and/or ROW application processes. If any TEC&WSC species are observed, the observations would be noted on appropriate data forms (see Addendum D-A). A list of all TEC&WSC species potentially occurring on the J2PA is provided in Table D-2.5. In addition, when and if TEC&WSC species are observed, efforts would be made to determine the activities (e.g., breeding, nesting, foraging, hunting) of the species on the J2PA. If any management agency (i.e., BLM, WGFD, USFWS) identifies a potential for concern regarding any of these species, additional inventory and monitoring may be implemented as specified in annual reports.

D-2.2.3 Sage Grouse

Annual sage grouse lek surveys would be conducted to determine lek locations and the extent of sage grouse breeding activity on potentially affected areas (see Map D-1.1). Surveys would be coordinated by the WGFD and would be conducted two times, a

Table D-2.5 Preliminary List of Threatened, Endangered, Candidate, Sensitive, and Wyoming Species of Concern Documented or Potentially Occurring on or in the Vicinity of the Jonah II Natural Gas Project Area, 1997[1].

Species		Status[2, 3]				Documented on or in Vicinity of the J2PA?[4]	Habitat Type(s)[5]
Common Name	Scientific Name	USFWS	BLM	WGFD	WYNDD		
BLM-MANAGED SPECIES							
Peregrine falcon	*Falco peregrinus*	LE	X	X	X	Yes	UB
Whooping crane	*Grus americana*	LE	X	X	X	Yes	FT
Black-footed ferret	*Mustela nigripes*	LE	X	X	X	Yes	BS, SB, CP, DS
Bald eagle	*Haliaeetus leucocephalus*	LT	X	X	X	Yes[6]	UB
Mountain plover	*Charadrius montanus*	C	X	X	X	Yes[6]	CP, DS
Northern goshawk	*Accipiter gentilis*	SC	–	X	X	Yes[6]	FT
Ferruginous hawk	*Buteo regalis*	SC	–	X	–	Yes[6]	UB
Western burrowing owl	*Athene cunicularia hypugaea*	SC	–	–	X	Yes[6]	BS, SB, CP, DS
Big piney milkvetch	*Astragalus drabelliformis*	SC	W[7]	–	X	Yes	BS
Cedar rim thistle	*Cirsium aridum*	SC	S[8]	–	X	Yes	BS
Large-fruited bladderpod	*Lesquerella macrocarpa*	SC	S[8]	–	X	Yes	UB
Opal phlox	*Phlox opalensis*	SC	W[7]	–	X	Yes	BS, SB
Tufted twinpod	*Physaria condensata*	SC	W[7]	–	X	Yes	UB
Turkey vulture	*Cathartes aura*	–	X	–	–	Yes	UB
Osprey	*Pandion haliaetus*	–	X	–	–	Yes[6]	FT
Northern harrier	*Circus cyaneus*	–	X	–	–	Yes[6]	UB
Sharp-shinned hawk	*Accipiter striatus*	–	X	–	–	Yes[6]	FT
Cooper's hawk	*Accipiter cooperii*	–	X	–	–	Yes[6]	FT
Red-tailed hawk	*Buteo jamaicensis*	–	X	–	–	Yes[6]	UB
Rough-legged hawk	*Buteo lagopus*	–	X	–	–	Yes	UB
Golden eagle	*Aquila chrysaetos*	–	X	–	–	Yes[6]	UB
American kestrel	*Falco sparverius*	–	X	–	–	Yes[6]	UB
Merlin	*Falco columbarius*	–	X	X	X	Yes[6]	UB
Prairie falcon	*Falco mexicanus*	–	X	–	–	Yes[6]	UB
Barn owl	*Tyto alba*	–	X	–	X	Yes[6]	UB
Great horned owl	*Bubo virginianus*	–	X	–	–	Yes[6]	UB
Long-eared owl	*Asio otus*	–	X	–	–	Yes	UB

Table D-2.5 (Continued)

Species		Status[2, 3]				Documented on or in Vicinity of the J2PA[4]	Habitat Type(s)[5]
Common Name	Scientific Name	USFWS	BLM	WGFD	WYNDD		
Short-eared owl	*Asio flammeus*	–	X	–	–	Yes[6]	UB
ADDITIONAL USFWS SPECIES OF CONCERN							
Western boreal toad	*Bufo boreas boreas*	SC	–	X	X	Yes	P/R
Eastern short-horned lizard	*Phrynosoma douglassi brevirostre*	SC	–	–	–	Yes	UB
Northern sagebrush lizard	*Sceleporus graciosus*	SC	–	–	–	Yes	BS, SB, DS
White-faced ibis	*Plegadis chihi*	SC	–	X	X	Yes[6]	FT (P/R)
Trumpeter swan	*Cygnus buccinator*	SC	–	X	X	Yes	FT (P/R)
Harlequin duck	*Histrionicus histrionicus*	SC	–	X	X	Yes	FT (P/R)
Columbian sharp-tailed grouse	*Tympanuchus phasianellus columbianus*	SC	–	–	X	Yes	BS, SB
Common tern	*Sterna hirundo*	SC	–	–	X	Yes	FT (P/R)
Black tern	*Chlidonias niger*	SC	–	X	X	Yes	FT (P/R)
Loggerhead shrike	*Lanius ludovicianus*	SC	–	–	–	Yes[6]	UB
Baird's sparrow	*Ammodramus bairdii*	SC	–	–	X	No	FT
Small-footed myotis	*Myotis ciliolabrum*	SC	–	X	–	No	UB
Long-eared myotis	*Myotis evotis*	SC	–	X	X	Yes	UB
Long-legged myotis	*Myotis volans*	SC	–	X	–	Yes	UB
Spotted bat	*Euderma maculatum*	SC	–	X	X	No	UB
Townsend's big-eared bat	*Plecotus townsendii*	SC	–	X	X	No	UB
Pygmy rabbit	*Sylvilagus idahoensis*	SC	–	X	X	Yes	BS
Allen's thirteen-lined ground squirrel	*Spermophilus tridecemlineatus allenl*	SC	–	–	X	Yes	UB
Preble's meadow jumping mouse	*Zapus hudsonius preblei*	SC	–	X	X	No	P/R
Swift fox	*Vulpes velox*	SC	–	X	X	No	UB
ADDITIONAL WYOMING GAME AND FISH DEPARTMENT SPECIES OF CONCERN							
Common loon	*Gavia immer*	–	–	X	X	Yes[6]	FT (P/R)
American white pelican	*Pelecanus erythrorhynchos*	–	–	X	X	Yes	P/R
American bittern	*Botaurus lentiginosus*	–	–	X	X	Yes	FT (P/R)
Snowy egret	*Egretta thula*	–	–	X	X	Yes[6]	FT (P/R)

Table D-2.5 (Continued)

Species		Status[2, 3]				Documented on or in Vicinity of the J2PA?[4]	Habitat Type(s)[5]
Common Name	Scientific Name	USFWS	BLM	WGFD	WYNDD		
Black-crowned night heron	*Nycticorax nycticorax*	–	–	X	X	Yes[6]	Pt (P/R)
Long-billed curlew	*Numenius americanus*	–	–	X	X	Yes	BS, P/R
Caspian tern	*Sterna caspia*	–	–	X	X	Yes[6]	FT (P/R)
Forster's tern	*Sterna forsteri*	–	–	X	X	Yes	FT (P/R)
Yellow-billed cuckoo	*Coccyzus americanus*	–	–	X	X	No	FT
Lewis' woodpecker	*Melanerpes lewis*	–	–	X	X	Yes[6]	FT
Ash-throated flycatcher	*Myiarchus cinerascens*	–	–	X	X	Yes	FT
Scrub jay	*Aphelocoma coerulescens*	–	–	X	X	No	FT
Plain titmouse	*Parus inornatus*	–	–	X	X	No	FT
Bushtit	*Psaltriparus minimus*	–	–	X	X	No	FT
Scott's oriole	*Icterus parisorum*	–	–	X	X	No	FT
Dwarf shrew	*Sorex nanus*	–	–	X	X	Yes[6]	P/R, BS, SB
Vagrant shrew	*Sorex vagrans*	–	–	X	–	Yes[6]	P/R, BS, SB
Little brown myotis	*Myotis lucifugus*	–	–	X	–	Yes	UB
Big brown bat	*Eptesicus fuscus*	–	–	X	–	Yes	UB
Pallid bat	*Antrozous pallidus*	–	–	X	X	No	UB
Cliff chipmunk	*Tamias dorsalis*	–	–	X	X	No	BS
Pinyon mouse	*Peromyscus truei*	–	–	X	X	No	BS, SB, DS
Water vole	*Microtus richarsoni*	–	–	X	X	Yes	P/R

1 Wyoming Natural Diversity Database (WYNDD) search for Mr. Pete Guernsey (1996); U.S. Fish and Wildlife consultation letter to Mr. Pete Guernsey (1996); Wyoming Game and Fish Department (WGFD) (1997) list of species of concern; and Fertig (1997).

2 USFWS = U.S. Fish and Wildlife Service, WGFD = Wyoming Game and Fish Department, WYNDD = Wyoming Natural Diversity Database, and BLM = Bureau of Land Management.

3 LE = USFWS listed endangered, LT = USFWS listed threatened, SC = USFWS species of concern, C = USFWS candidate species, X = given special status by the agency listed (i.e., WGFD, WYNDD, and/or BLM species of concern).

4 Indicates documentation of amphibian, reptile, or bird species in Sublette County (Baxter and Stone 1980; Fertig 1997); documentation of bird species within latitude 42°, longitude 109° (Dorn and Dorn 1990; WGFD 1992; WGFD 1996b); and/or documentation of mammal species within latitude 42°, longitude 109° (WGFD 1992, 1996b) or within Sublette County (Fertig 1997).

5 P/R = pond/riparian, BS = big sagebrush, SB = saltbush, CP = cushion plant, DS = disturbed, UB = ubiquitous, FT = fly through.

6 Species has been documented breeding within latitude 42°, longitude 109° (Dorn and Dorn 1990; WGFD 1992).

7 BLM "Watch" plant species per the draft list dated March 10, 1997.

8 BLM "Sensitive" plant species per the draft list dated March 10, 1997.

minimum of ten days apart, during March and April of each year, by the WGFD, BLM, and/or an Operator-financed BLM-approved biologist. Surveys may be conducted aerially or on the ground, as deemed appropriate by the WGFD; aerial surveys would be used only to determine lek locations. If aerial surveys are conducted, financial support sufficient to cover aircraft expenses would be provided by the Operators. Leks within 2 mi of existing and proposed disturbance areas would be monitored three times annually by the WGFD and/or BLM between March 1 and May 15 to determine lek attendance. Data collected during these surveys would be provided on Sage Grouse Lek Records or other suitable forms (see Addendum D-A).

Sage grouse winter use surveys of potentially affected areas (see Map D-1.1) would be coordinated by WGFD and implemented by the BLM and/or WGFD during December through March as deemed appropriate by these management agencies, and results would be presented in the annual report. These surveys would be conducted to identify sage grouse wintering areas. Data collected during winter surveys would be provided on General Wildlife Observation Data Sheets or other suitable forms (see Addendum D-A).

D-2.2.4 General Wildlife

BLM, WGFD, and some Operator personnel on a voluntary basis would keep records of the wildlife species observed during the course of their activities on the J2PA. The information provided would include observations of wildlife species; their numbers, location, activity; and other pertinent data, as applicable and identified on the General Wildlife Observation Data Sheet presented in Addendum D-A of this Wildlife Monitoring/Protection Plan. Some of the desired information may be difficult for Operators to define (e.g., specific legal locations in U.S. Geological Survey [USGS] coordinates, species type for hard to recognize species [passerine birds and small mammals], sex). Where Operators are uncertain of the legal location for an observation, a general description of the location may be provided (e.g., 100 yards north of well #___), and in instances where species or sex information are questionable, Operators would identify the observation as such.

Comments received during scoping for the Jonah Field II EIS identified public and agency concerns regarding antelope movement across the J2PA to and from wintering areas north of the area. To further understanding of pronghorn movements on the J2PA, the WGFD would coordinate efforts to document pronghorn antelope migration periods and movement patterns and their relationship to disturbance.

D-2.3 PROTECTION MEASURES

The wildlife protection measures proposed herein have been developed from past measures identified for oil and gas developments in Wyoming. These measures may be modified in any given year as deemed appropriate by management agencies and specified in annual reports. It is assumed that as the wildlife of the J2PA are further described and impacts identified, some protection measures would be removed, whereas others may be added. Protection measures would be implemented by Operators with assistance from and/or in consultation with the BLM.

The principle protection measure for most wildlife species would be avoidance of sensitive/crucial habitats (e.g., raptor nests, sage grouse leks). However, numerous species-specific measures may be implemented. Additionally, general wildlife protection measures (see Section D-2.3.4) likely would benefit the majority of wildlife species found on and adjacent to the J2PA.

D-2.3.1 Raptors

The primary protection measure for raptor species on the J2PA would be avoidance of active nest locations during the breeding season. Active nests are defined as any raptor nest that has been used within the last three years. Depending on the timing of construction and drilling activities, all surface-disturbing activities would be restricted from February 1 through July 31 within a 0.5-mi radius of active or occupied raptor nests, except ferruginous hawk, bald eagle, or peregrine falcon nests, for which the seasonal buffer would be 1.0 mi. Exceptions to this measure may be made where raptor pairs are documented using alternate nests greater than 0.5 mi from the surface disturbance area within the same nesting territory. In addition, well locations, roads, ancillary facilities, and other surface structures requiring repeated human presence would not be constructed within 825 ft of active raptor nests (2,000 ft for bald eagles), where practical. The seasonal buffer distance and exclusion dates may vary, depending on factors such as nest

activity status, species, prey availability, natural topographic barriers, and line-of-sight distances. Actual nest buffers for each active raptor nest would be established in annual reports.

Operators would notify the BLM immediately if raptors are found nesting on or within 825 ft of project facilities, and Operators would assist the BLM, as necessary, to erect ANSs, as appropriate. However, the use of ANSs would be considered as a last resort for raptor protection. If nest manipulation or a situation requiring a "taking" of a raptor nest becomes necessary, a special permit would be obtained from the Denver USFWS Office, Permit Section. Permit acquisition would be coordinated with the Wyoming State USFWS Office in Cheyenne and would be initiated with sufficient lead time to allow for development of mitigation. Required corresponding permits would be obtained from the WGFD in Cheyenne. Consultation and coordination with the USFWS and WGFD would be conducted for all protection activities relating to raptors.

If it is found that project activities could potentially be affecting raptor nesting on or adjacent to the J2PA, as determined from decreased raptor productivity or nesting or documented nest abandonment or failure, ANSs may be constructed at a rate of up to two ANSs per impacted nest, or existing, degraded raptor nests may be upgraded/reinforced to minimize potential impacts. The location, design, and other pertinent data regarding ANSs or nests proposed for upgrading would be identified in annual reports, and these ANSs would be located within the nesting territory of potentially affected raptor pairs and outside of the line-of-sight or nest buffer of actively nesting pairs, where possible. Operators would be responsible for the annual maintenance of ANSs throughout the LOP. Annual ANS maintenance activities would be completed after August 1 and prior to September 15 each year, as necessary. ANSs would be placed within the nesting territories of potentially affected raptor pairs at sites sufficiently removed from development activities to minimize or avoid potential adverse effects. All ANSs on public lands would become the property of the BLM upon completion of the project.

In cases where existing project features (e.g., well locations) are located within the nest buffers of active raptor nests, no extensive maintenance activities (e.g., workovers) would be allowed during critical periods (i.e., approximately early March through mid-June). The exact dates of exclusion would be determined by the BLM and likely would vary between nests and from year to year, depending on the species present and variations in weather, nesting chronology, and other factors.

D-2.3.2 TEC&WSC

USFWS and WGFD consultation and coordination would be conducted for all protection activities relating to TEC&WSC species and their habitats. Where possible, these actions would be specified in advance in the annual reports.

D-2.3.2.1 Black-footed Ferret

If prairie dog colonies of sufficient size and burrow density for black-footed ferrets are scheduled to be disturbed, as identified in annual reports, black-footed ferret surveys of these colonies would be conducted pursuant to USFWS decisions made during informal consultations. Survey protocol would adhere to USFWS guidelines as established in USFWS (1989a) and would be conducted by a USFWS-qualified biologist a maximum of one year in advance of the proposed disturbance. Reports identifying survey methods and results would be prepared and submitted to the USFWS and BLM in accordance with Section 7 of the Endangered Species Act of 1973, as amended, and the Interagency Cooperation Regulations. Surveys would be financed by the Operators.

If black-footed ferrets are found on the J2PA, the USFWS would be notified immediately and formal consultations would be initiated to develop strategies that ensure no adverse effects to the species. Before ground-disturbing activities are initiated in black-footed ferret habitat, authorizations to proceed must be received from the BLM, in consultation with the USFWS.

D-2.3.2.2 Bald Eagle, Peregrine Falcon, Ferruginous Hawk, and Golden Eagle

Protection protocol generally would be as described for raptors (see Section D-2.3.1). Additional measures would be applied on a species- or site-specific basis, as deemed appropriate by the USFWS and/or BLM, and specified in annual reports.

D-2.3.2.3 Mountain Plover

If a mountain plover nest is observed within survey areas (see Section D-2.2.2.3), planned development activities would be delayed at least 30 days. If a brood is discovered, planned activities would be delayed at least seven days.

D-2.3.2.4 Western Burrowing Owl

Other than the avoidance of prairie dog colonies, where practical (see Section D-2.3.2.1), and the avoidance of active raptor nests during the nesting period (see Section D-2.3.1), no additional species-specific protection measures are proposed. Additional measures may be applied if burrowing owl productivity on the J2PA and vicinity is noted to be declining. These measures would be identified in annual reports.

D-2.3.2.5 Other TEC&WSC Species

If, during surveys of areas within 0.5 mi of proposed disturbance sites (see Section D-2.2.2.5), nests or other crucial features for any TEC&WSC species are found (e.g., loggerhead shrike nests), avoidance of these features would be accomplished in consultation and coordination with the BLM, USFWS, and WGFD. Construction activities in these areas would be curtailed until there is concurrence between BLM, USFWS, and WGFD on what activities can be authorized. Activities would, in most cases, be delayed until such time that no adverse effects would occur (e.g., after fledging).

No additional protection measures would be applied for other sensitive species potentially present on the J2PA; however, it is assumed that the protocol specified below for general wildlife would benefit TEC&WSC species as well. If any management agency (i.e., BLM, WGFD, USFWS) identifies a potential for impacts to any TEC&WSC species, additional measures may be implemented as specified in annual reports.

D-2.3.3 Sage Grouse

Surface disturbance and actions that create permanent and high profile structures such as buildings and storage tanks which are suitable as raptor perches, would not occur within 0.25 mi of sage grouse leks on and adjacent to the J2PA. To protect nesting sage grouse, operators would restrict construction activities between March 1 and June 30 within a 2.0-mi radius of active sage grouse leks on suitable sage grouse nesting habitat as determined during on-site reviews of proposed development areas. In addition, if an active sage grouse nest is identified in an area proposed for disturbance, surface-disturbing activities would be delayed in the area until nesting is completed.

D-2.3.4 General Wildlife

Unless otherwise indicated, the following protection measures would be applied for all wildlife species. Additional measures primarily designed to minimize impacts to other J2PA resources (e.g., vegetation and surface water resources, including wetlands, steep slopes, etc.) are identified in EIS Section 2.4.11 and Chapter 4.0; these measures may provide additional protection for area wildlife as well. Additional actions may be applied in any given year to further minimize potential impacts to wildlife. These actions would be specified in annual reports.

All roads on and adjacent to the J2PA that are required for the proposed project would be appropriately constructed, improved, maintained, and signed to minimize potential wildlife/vehicle collisions and facilitate wildlife (most notably, antelope) movement through the J2PA. Appropriate speed limits would be adhered to on all J2PA roads, and Operators would advise employees and contractors regarding these speed limits. In addition, some existing roads on the J2PA and surrounding transportation planning area may be reclaimed (see EIS Appendix A, Transportation Plan).

No road or pipeline ROW fencing is proposed for the project; however, if ROW fencing is required, it would be kept to a minimum and the fences employed would consist of four-strand barbed wire meeting BLM guidelines for facilitating wildlife movement. Wildlife-proof fencing would be utilized only to enclose reclaimed areas where it is determined that wildlife species are impeding successful vegetation establishment. In addition, improvements to existing fences on the J2PA (most notably, the fence separating the BLM Pinedale Resource Area from the Green River Resource Area) may be made to facilitate antelope movements across the J2PA.

To enhance the use of the J2PA during dry periods, additional water sources may be developed on the

area. The number, location(s), and design of these water sources would be developed in consultation with BLM, WGFD, and Operators, and would be specified in annual reports. Operators would assist WGFD and BLM in the implementation of this "water for wildlife" program on the J2PA and surrounding areas.

Potential increases in poaching would be minimized through employee and contractor education regarding wildlife laws (see Section D-2.1.2). If violations are discovered on the J2PA, Operators would notify the BLM and WGFD immediately, and if the violation is committed by an employee or contractor, said employee or contractor would be disciplined and may be dismissed by the Operator, and/or prosecuted by the WGFD.

Additional nonspecies-specific wildlife mitigations include the following.

- Reserve, workover, and production pits potentially hazardous to wildlife would be adequately protected by netting and/or fencing as directed by the BLM to prohibit wildlife access.
- Siphons would be constructed at each reserve pit to collect, as necessary, any undesirable materials that may enter pits.
- No surface water or shallow groundwater in connection with surface water would be utilized for the proposed project.
- Firearms and dogs would not be allowed on the J2PA during working hours by BLM or Operator employees or their contractors.
- If injured wildlife are observed on the J2PA, Operator personnel would contact the BLM Pinedale Resource Area and the WGFD Pinedale office. Under no circumstances would injured wildlife be approached or handled.

D-2.4 SUMMARY

Table D-2.6 provides a summary of the monitoring and protection measures that would be applied as components of this plan.

Table D-2.6 Summary of Wildlife Reporting, Monitoring, and Protection Measures, Jonah II Natural Gas Project.

Measure	Responsible Entities	Dates
Annual reports	Operators	Draft - November 15 Final - Early February
Meetings	Operators, WGFD, USFWS, BLM	As necessary
Raptor nest inventory	Operators	Apr[illegible]-May 1997
Raptor productivity monitoring	Operators	March-July
Black-footed ferret surveys	BLM, USFWS, Operators	As necessary
Mountain plover surveys	BLM	March 15-August 15
Western burrowing owl surveys	BLM	June-July
Other TEC&SC surveys	BLM, USFWS, Operators	As necessary
Sage grouse lek inventories	WGFD, Operators	March-April
Sage grouse lek monitoring	WGFD, BLM	March-May
Sage grouse winter use surveys	BLM, WGFD	December-March
Pronghorn antelope movement observations	WGFD	Fall, winter, spring
General wildlife observations	BLM, WGFD, Operators	Yearlong
Raptor avoidance	Operators, BLM	February-July
ANS construction	Operators, BLM	As necessary
Mountain plover avoidance	Operators, BLM	As necessary
Western burrowing owl avoidance	Operators, BLM	As necessary
Sage grouse lek/nest avoidance	Operators, BLM	March-June
General wildlife avoidance and protection	Operators, BLM, USFWS, WGFD	As necessary

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ADDENDUM D-A:

EXAMPLE DATA FORMS

GENERAL WILDLIFE OBSERVATION DATA SHEET

Month/year_____ Observer_____ Type of survey_____ Page ___ of ___

Notes _____

Date	Species	# indiv. by age and sex	Location	Habitat type	Activity/direction of movement	Comments/weather conditions

[1] Circle any uncertain data (i.e., partial counts, uncertain age or sex) or note as unknown.

RAPTOR NESTING RECORD

Page ___ of ___

Nest Number_____ Location_____ Habitat Type_____

Map Location

Date first observed_____
Initial observer_____
Nest type_____
Nest material_____
Substrate_____
Rim/tree height (m)_____
Nest height above ground level (m)_____
Elevation_____
Nest exposure_____
Comments_____

USGS Quad_____

Date	Status	Species	# adults	# eggs	# young	Observer	Comments (condition, activity of individuals, etc.)

A photo of the nest location may be provided on reverse.

RAPTOR OBSERVATION DATA SHEET

Month/year_____ Observer_____ Type of survey_____ Page ___ of ___

Notes _____

Date	Species	# indiv. by age and sex	Location	Habitat type	Activity	Comments/weather conditions

[1] Circle any uncertain data (i.e., partial counts, uncertain age or sex) or note as unknown.

SAGE GROUSE LEK RECORD Page __ of __

Lek Number_____ Location_____ Habitat Type_____

Map Location

Date first observed_____
Initial observer_____
Slope/topography_____
Elevation_____
Lek exposure_____
Comments_____

USGS Quad_____

Date	Time	Status	# males	# females	Weather conditions	Observer	Comments

APPENDIX E

SUMMARY OF PUBLIC COMMENTS RECEIVED ON THE JONAH II PROJECT AREA NATURAL GAS DEVELOPMENT FINAL EIS AND BLM RESPONSES

SUMMARY OF PUBLIC COMMENTS RECEIVED ON THE JONAH II PROJECT AREA NATURAL GAS DEVELOPMENT FEIS AND BLM'S RESPONSES

Introduction

A total of 40 letters commenting on the Final EIS were received. Twenty-six letters expressed strong support for the project, one opposed the project, eight supported the project but had comments, and five letters did not express support for or opposition to the project but had comments. Companies, organizations, and agencies are identified below by name in the summary of their comments (in bold and italics). Individuals are not identified. The BLM response follows the summary of the comment.

Comments and Responses

BLM incorporated visibility analysis at the 0.5 deciview "limit of acceptable change" without a legal obligation to do so. Inclusion of the 0.5 level of analysis has no valid basis. This request by EPA and USFS should have properly been denied. At a minimum, the 0.5 level analysis should have been added only in an appendix. This approach would have added clarity to the document and would have removed any expectation that such analysis would be reflected in the ROD.

BLM is obligated under NEPA to fully disclose potential significant adverse impacts; air quality modeling results are compared to applicable regulatory standards and other scientifically based thresholds, in order to determine potential significance. Since there is no applicable visibility standard in the State of Wyoming, BLM compared predicted visibility impacts to a "just noticeable change" of 1.0 deciview. However, under their own management authority, the USDA Forest Service has identified 0.5 deciview as their visibility Limit of Acceptable Change, and specifically requested that impact assessment results be compared to this threshold. This is why the analysis at the 0.5 deciview level was included in the EIS. We agree that doing so made the EIS more complex and therefore more difficult to explain.

Mitigation measures which will be included in the ROD should be identified as a part of the preferred alternative. Without such information, the reader of the FEIS is unable to formulate an unqualified position regarding the preferred alternative.

Mitigation measures to be included in the ROD are unknown at the FEIS stage of the process. Including mitigation measures which will be included in the ROD would be pre-decisional and would violate the intent of NEPA. BLM agrees with the point about being unable to formulate an unqualified position regarding the preferred alternative. However, a reasonable position can be formulated and

specific feedback provided regarding possible mitigation measures that should be or shouldn't be accepted and implemented.

Wildlife Management Institute asked why only generic responses were given to comments, except for Air Quality issues? What additional information on wildlife habitat or wildlife species issues was taken into account for the FEIS that was not available for the DEIS? Referral to unaltered verbiage in the DEIS violates the intent and purpose of preparing both a DEIS and a FEIS.

The information provided in the DEIS for existing wildlife species, their habitats, potential impacts as a result of the Jonah Field II project, and proposed mitigation measures is current and includes a number of recent studies specifically conducted to supplement existing wildlife information for the proposed project. Wildlife inventories, including lek surveys, and monitoring, were conducted after the original Jonah Environmental Assessment was completed. The information in the DEIS is deemed sufficient by BLM; thus, no new information was provided in the FEIS. As stated in the DEIS, additional wildlife inventory and monitoring in the Jonah II Project Area and surrounding areas will be conducted as specified the Wildlife Monitoring/Protection Plan, and annual reports documenting the results of these studies will be made available to all potentially affected individuals and groups (see Appendix D).

The FEIS stated that as the project developed, additional planning would be conducted and further mitigative action may be applied. Why isn't this information in the FEIS?

Additional planning will be done as specifics (such as well, road and pipeline locations) are known. The section referred to was intended to make it clear that further mitigative action may be applied when the specifics are known or if unforeseen problems are encountered during field development.

Snyder Oil Corp. and other operators said that a Calmet/Calpuff model analysis has been run on Jonah II that shows no more than a 0.3 deciview change on any given day for the cumulative impact analysis.

CALMET/CALPUFF model results were developed separately from the NEPA analysis, and not provided to BLM until after the FEIS was published. This information is helpful and tends to confirm the model used for this effort is indeed a screening model, designed to provide conservative, but reasonable results which would over-predict actual impacts. However, the CALMET/CALPUFF modeling protocol was not reviewed by BLM Air Quality Personnel or their peers. Since this information was not provided during the EIS comment periods, BLM will treat CALMET/CALPUFF modeling results as new information as described in the

FEIS and in this ROD. The air quality decisions made in this ROD may be confirmed or modified after BLM and peer reviews are completed.

Several of the Operators believe the possible requirement to hire a quality assurance/quality control individual(s) during project development to ensure project development specifications are adhered to is unnecessary, unfair and unprecedented.

BLM decided to appoint a project manager and to require the Operators, either individually or collectively, to appoint a sole point of contact to coordinate compliance issues with the project manager. Compliance with authorizations is a concern for the BLM and the public as evidenced by the comments received on the DEIS. It is felt that having a project manger assigned to the Jonah Field will resolve the compliance issue.

EPA remains concerned the FEIS did not include projected emissions from known gas development activities such as those occurring north of the Jonah II project area. Without fully disclosing reasonable foreseeable development and the associated impacts, the possible decision on the Jonah II project could be made without knowledge of the potential adverse impact on adjacent sensitive receptor areas.

BLM did not include these projects in the EIS because they were unsettled and speculative (see page 7-67 of the FEIS). Both the DEIS and the FEIS clearly stated which sources were included in the cumulative impact assessment, as well as which sources were excluded and why they were excluded. However, the ROD addresses this concern in a different manner. The total NO_x emission levels of concern (977 tons per year for the Rock Springs District and 158.6 tons per year from the Jonah II project) will ensure the USDA Forest Service's Limit of Acceptable Change is not exceeded. As long as total emissions do not exceed these levels, exploration wells elsewhere in the District may be approved because no air quality significance criteria will be exceeded. Just because the Moxa Arch (1,325 wells), Fontenelle (1,317 wells), and Jonah II (450 wells) EISs addressed a total of 3,092 wells does not mean 3,092 wells will be drilled, much less all of them on line at the same time. If a new discovery is made by exploration drilling elsewhere, then a new NEPA analysis will be performed for new potential development. Any such analysis would also address cumulative impacts on the PSD Class I wilderness areas. This would assume that all the wells and compressors analyzed up to this point would be drilled and produce gas, unless there is a technical basis to assume less development would occur, as done in this EIS.

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The bottom line is that the sensitive receptor areas will be protected in accordance with laws, regulations, and the State of Wyoming's SIP. Meanwhile, exploratory drilling can occur and not create a significant impact.

It appears that the assumption is being made that all wells and compressors analyzed in the various NEPA documents would be operational just because the NEPA analysis has been completed. This is not the case at all. That is why BLM is tracking NO_x emissions in southwest Wyoming in cooperation with DEQ. When one of the levels of concern are reached, BLM will notify DEQ, EPA, and the USDA Forest Service and will undertake additional cumulative air quality environmental review as required by CEQ regulations. This EIS has done what the NEPA process calls for in that it identified a potential problem and now it is time for the agencies, industry, and the public to work together to decide how to resolve the issues. We see that this is already occurring with SWYTAF; that effort just needs time to be completed.

Mitigation of air quality impacts should be addressed in alternatives so that the decision-maker can choose the type of mitigation desired.

Before this comment can be addressed, the difference between an alternative and a mitigating measure needs to be described. An alternative "represents an alternative means of satisfying the identified purpose and need, and of resolving issues." Alternatives requires "rigorous exploration and objective evaluation." Mitigating measures are "practicable means to avoid or minimize environmental harm." They are added to, or included in, an alternative to further reduce or minimize environmental harm.

CEQ Regulations regarding range of alternatives (Section 1505.1(e) states: ...the alternatives considered by the decision maker are encompassed by the range of alternatives discussed in the relevant environmental documents and that the decision maker consider the alternatives described in the environmental impact statement....." In CEQ's "Questions and Answers About the NEPA Regulations" question *1b.* asks: "How many alternatives have to be discussed when there is an infinite number of possible alternatives?" The answer is "...only a reasonable number of examples, covering the full spectrum of alternatives, must be analyzed and compared in the EIS. ...What constitutes a reasonable range of alternatives depends on the nature of the proposal and the facts in each case." BLM feels that a reasonable number of alternatives covering the full spectrum of alternatives has been done in this case. BLM disagrees that an array of possible mitigation measures constitutes reasonable alternatives.

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A variety of mitigation measures can be used on this project in various combinations. BLM has limited authority to require many of those measures. Therefore, it would be fruitless to list every measure and every possible combination and then rigorously explore and objectively evaluate them as an alternative. BLM has herein provided a number of potential mitigating measures for the State to consider in its permitting process.

In addition, the Green River Basin Advisory Committee formed by Secretary Babbitt made some very strong recommendations for streamlining NEPA. One key recommendation was "BLM should limit the number of alternatives to 'real world' scenarios and within a reasonable range." To include a host of possible alternatives to mitigate air quality impacts is counter to this recommendation.

The EIS and accompanying revised air quality technical support document should have included a quantitative analysis of existing IMPROVE data for the Bridger-Teton Wilderness area. Does the IMPROVE data for the previous 10 years show any correlation between visibility and ambient nitrate levels? Has the five to 10 percent of the best visibility days shown any change in the last 10 years, and do these changes suggest any trend for visibility during this 10 year period? By presenting log-normal probability frequency distributions for visibility and nitrate levels in the previous 10 years, correlations and visibility trends could be established. This data should be presented in Chapter 3, "The Affected Environment" section.

As discussed with EPA Region VIII staff and other "Stakeholder" group members prior to conducting the analysis, historic IMPROVE optical monitoring (light extinction) data were evaluated, and 1995 data were demonstrated to be representative of background conditions. Extensive discussions were held to determine how hourly extinction, relative humidity, and modeled pollutant concentrations would be analyzed to predict potential visibility changes (reported in deciviews) from the Proposed Action and Alternatives. Finally, both the IWAQM visibility analysis procedures (developed in cooperation with the EPA and based on both historic IMPROVE data and first-order principles), as well as the assumed daily Standard Visual Range values, were reported in the DEIS and FEIS.

As one of several members of the SWYTAF and IMPROVE steering committee, EPA may want to suggest further statistical analysis be performed regarding historic optical, physical/chemical, and image data collected at any of the IMPROVE monitoring locations. However, such data manipulations regional trends investigations are not necessary to perform an adequate NEPA analysis.

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Both a summary of IMPROVE visibility data and NADP/NTN precipitation chemistry data need to be included in the "Affected Environment" in order to present any impacts that are already occurring.

Daily visibility data measured during 1995 were presented in both the DEIS and FEIS, which also included appropriate elemental deposition and lake chemistry analyses for comparison to USDA Forest Service atmospheric deposition Limits of Acceptable Change. Weekly bulk precipitation chemistry data collected at the Fremont Lake NADP/NTN sampling station were not necessary to perform the impact assessment.

Why did the FEIS indicate "the most significant air pollutant throughout the J2PA is particulate matter" when the background ozone value is closer to the ambient air quality standards?

The EIS should not have indicated the significance of any single pollutant. The background concentrations of all criteria pollutants are equally significant.

Why weren't specific air quality impacts (pollutant concentrations) predicted for the PSD Class II Wind River Indian Reservation? Why were cumulative predicted NO_2 concentrations deleted between the DEIS and FEIS for the Class I Bridger Wilderness area? As a result, the FEIS section has deleted important information from the DEIS.

The FEIS did report the maximum near-field NO_2 impact (page 26, paragraph 6), which was well below the PSD Class II increment at a location within the proposed well field (12 $\mu g/m^3$ direct impact compared to 25 $\mu g/m^3$ PSD Class II increment).

Similarly, the FEIS also reported the maximum far-field cumulative NO_2 impact (page 37, Table 4.2d), which was also well below the PSD Class I increment at the Bridger Wilderness Area (0.047 $\mu g/m^3$ direct impact compared to 2 $\mu g/m^3$ PSD Class I increment). As described in the FEIS (page 7-98, comment response 29) "given the numerous "reasonable, but conservative" analysis assumptions stated in the DEIS (page 4-10), it is very unlikely air quality impacts at the Wind River Indian Reservation Roadless Area would be the same as, or greater than, those reported for the PSD Class I Bridger Wilderness Area boundary." Contrary to the commentor's claim, no important information was deleted from the FEIS.

What is the meaning of "The ISCST3 model was used to estimate the maximum 24-hour average pollutant impacts on visibility ..." (FEIS page 24, third paragraph)?

The following sentence would have been more clear: "The ISCST3 model was used to estimate the maximum 24-hour pollutant impacts and potential visibility impacts, based on optical data collected at Fremont Lake, where background visibility measurements

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have been collected and are considered representative of the PSD Class I Bridger Wilderness Area."

What is the scientific basis (technical reference) for the statement "any predicted visibility impacts below 1.0 deciview would not be perceptible"?

As described in the FEIS (page 7-19, comment response 6), Pitchford and Malm (1994) stated "In addition to placing perception and valuation results on a perceptually correct scale, the deciview scale provides a simple means for investigators to avoid the problem of extrapolating their results to sub-threshold changes in visibility, since imperceptible changes (less than 1 or 2 dv) are easily identified." Therefore, 1.0 deciview is a "just noticeable change," and a 0.5 deciview change would not be perceptible.

The FEIS should state "that from past experience, WDEQ is unlikely to require a 'cumulative air quality impacts analysis' since these oil and gas sources are considered to be minor sources."

The FEIS correctly states (page 25, paragraph 2) "It is important to note that before development could occur, the WDEQ would review specific air pollutant emission preconstruction permits which examine potential project-specific air quality impacts. As part of these permits (depending on source size), WDEQ could require a cumulative air quality impacts analysis. Thus, as development occurs, additional site-specific air quality analyses would be performed to ensure protection of air quality resources." Since WDEQ is the primary air quality regulatory agency (with EPA oversight), they are the appropriate organization to determine what type and level of additional analysis is necessary.

For compliance with NEPA regulations, BLM has a responsibility to address mitigation measures (identifying the appropriate level of air pollutant emission controls) to reduce environmental impacts, even if the mitigation measure is outside the authority of BLM.

Potential mitigation measures were described in the FEIS (Section 4.1.1.5, pages 29 through 32), including several mitigation measures "outside the jurisdiction of the BLM's management authority."

Potential control measures should be incorporated into the proposed alternatives as a way of mitigating impacts. Specifically, nonselective catalytic reduction should be recognized as less expensive with better NO_x control when compared to lean combustion technology.

As clearly stated in the FEIS (page 31, paragraph 6) the discussion of potential mitigation measures was not intended to "identify a required technology; the appropriate level of control would be determined and required by the WDEQ during the preconstruction permit process." In addition, the FEIS also compared (page 30, paragraphs 3 and 4) the

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cost/effectiveness of nonselective catalytic reduction ($110-180/ton removed at 1-5 g/hp-hr) to lean combustion technology ($490-690/ton removed at 1.5-4.0 g/hp-hr).

The FEIS should state that the BLM will recommend a level of NO_x emissions in the ROD.

The FEIS is an analysis and disclosure document, not a decision document, therefore the FEIS only identified what level of impacts would occur at various levels of emissions. Since WDEQ is the primary air quality regulatory agency (with EPA oversight), they are the authorized organization responsible to determine what type and level of air pollutant emission control is necessary.

The FEIS should state that in the past, WDEQ has never required a detailed PSD increment consumption analysis for oil and gas operations, and they are unlikely to require one in the future.

As the primary air quality regulatory agency (with EPA oversight), WDEQ is the authorized organization responsible for implementing the Clean Air Act through an approved State Implementation Plan. As correctly stated in the FEIS (page 37, paragraph 4), "At the time of a preconstruction air quality permit application, WDEQ may require a much more detailed PSD increment consumption analysis." The Bureau recognizes Congress reserved air quality regulatory program functions (e.g.; PSD increment consumption analyses) to be implemented by local, state and tribal air quality regulatory agencies under EPA oversight and approval. Finally, the FEIS also stated (page 7-73, comment response 12) "If EPA believes the "cumulative status of Class I and Class II PSD NO_2 increment that has been consumed to date" in southwestern Wyoming, then EPA has a legal obligation to either: 1) obtain a complete (not streamlined) PSD Increment Consumption Analysis from the primary air quality regulatory agency (WDEQ); or 2) withdraw approval of the State Implementation Plan NSR program, and conduct a complete PSD Increment Consumption Analysis under a Federal Implementation Plan, as required by the U.S. Congress under the Clean Air Act.

The characterization of the background visibility in the Bridger-Teton is not adequately addressed in the FEIS.

As stated previously, historic IMPROVE optical monitoring (light extinction) data were evaluated, and 1995 data were demonstrated to be representative of background conditions. Actual daily Standard Visual Range data were presented in both the DEIS and FEIS.

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How have past natural gas operations affected visibility in the Bridger-Teton?

A NEPA air quality impact assessment is designed to determine and disclose what potential significant adverse impacts are likely to occur from implementation of the Proposed Action or Alternatives in addition to the existing conditions (Affected Environment). NEPA is not intended to be an encyclopedic assessment of historic environmental conditions and trends.

As one of several members of the SWYTAF and IMPROVE steering committee, EPA may want to suggest further statistical analysis be performed regarding historic optical, physical/chemical, and image data collected at any of the IMPROVE monitoring locations. However, such regional trends investigations are simply not necessary to perform an adequate NEPA analysis.

How were potential emissions reduced from the "conservative" to the "less conservative" as defined in the Moxa Arch and Fontenelle EIS', as assumed in the Jonah Field II air quality impact assessment?

Based on information gathered after completion of the Moxa Arch and Fontenelle EIS' Air Quality Technical Report, BLM determined that the "less conservative" compression emission scenario (563 v. 5,830 tons per year NO_x emissions), plus an additional 0.44 tpy NO_x from each well site dehydrator and separator heater, was an improved "reasonably foreseeable development scenario" for the Jonah Field II Cumulative Air Quality Impact Assessment.

IMPROVE site visibility data were not sufficiently analyzed to determine what impacts from emission sources permitted prior to January 1996 would have in the Bridger-Teton Wilderness Area (including the Texas Gulf Trona Facility which is permitted to emit 654 tons SO_2 per year).

As stated in the FEIS (page G-12, Table G-2.6 footnote), "Texas Gulf Soda Ash Inc. emissions were erroneously included in Table 2.6 of the August 1997 Jonah Field II Air Quality Technical Support Document (TRC 1997a). The facility was operational in 1995, therefore these emissions were included in the background air quality concentrations (Affected Environment)." Background visibility measurements collected at Fremont Lake throughout 1995 reflect sources emitting air pollution throughout 1995, and were considered representative of the PSD Class I Bridger Wilderness Area.

The Formaldehyde Unit Risk Factor of 1.3 x 10^{-1} is too high.

The Formaldehyde Unit Risk Factor of 1.3 x 10^{-1} reported in Table G-5.7 of the FEIS (page G-29) was in error. The actual Formaldehyde Unit Risk Factor applied in the

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analysis was 1.3 x 10^{-5}; therefore no adjustment of the reported Cancer Risk modeling results is necessary.

Since the FEIS predicts visibility impairment to the Bridger Teton Wilderness Area contrary to the Wyoming SIP requirement to "assure reasonable progress toward achieving the national visibility goal of preventing any future, and remedying any existing visibility impairment due to man-made sources in mandatory Class I areas," mitigation measures need to be addressed in the EIS and ROD.

Again, as clearly stated in the FEIS (page 31, paragraph 6) the discussion of potential mitigation measures was not intended to "identify a required technology; the appropriate level of control would be determined and required by the WDEQ during the preconstruction permit process." As the primary air quality regulatory agency (with EPA oversight), WDEQ is the authorized organization responsible for implementing the Clean Air Act (including the National visibility goal) through an approved State Implementation Plan.

The BLM should quantify how conservative the air quality modeling results are. For example, if only 300 wells were drilled (rather than the 450 analyzed), would the visibility impact be reduced by a factor of 2 or 10 or a higher amount? An actual percentage decrease in predicted visibility impacts would be valuable.

As described in the FEIS (page 7-55, comment response 14), "The ISCST3 instantaneous, straight-line Gaussian screening model was used to predict "reasonable, but conservative" air quality impacts based on hourly meteorology data collected near Rock Springs, Wyoming. The model assumes air pollutant emissions would be transported to the PSD Class I Bridger Wilderness Area in a direct, straight line for the full hour of observed winds. The model does not alter the transport wind direction or speed due to terrain features.

"In reality, transport winds are strongly influenced by terrain features, and even a single hour of constant transport is unlikely to occur. For example, emissions transported at low wind speeds towards the Bridger Wilderness Area one hour may be transported in a completely different direction during the next hour, well before they reach the Bridger Wilderness Area boundary. This type of pollutant transport may be simulated with more sophisticated (and data intensive) dispersion models such as CALPUFF. In a separate "puff" analysis (BLM 1996b), emission sources originating throughout the Green River Basin (including the Jonah Field II project area) reached the PSD Class I Bridger Wilderness Area boundary only 67 per cent of the time."

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The FEIS also described (pages 34 through 37) many other reasonable, but conservative assumptions which overestimate the predicted air quality impacts, plus five assumptions which potentially underestimate potential impacts. In addition, Table 4.2c (page 29) estimated the level of potential visibility impact from a reduction in Jonah Field II well development and necessary compression. At 300 wells, development was not predicted to exceed the USDA Forest Service visibility Limit of Acceptable Change (0.5 deciview).

Regarding potential visibility impacts from the Proposed Action and other cumulative sources, the FEIS concluded (page 38, paragraph 7), "Given the inherent conservatism in the analysis, it is unlikely (but not impossible) that cumulative air pollutant emissions from throughout southwestern Wyoming could cause significant regional haze impacts in the PSD Class I Bridger Wilderness Area."

The annual PM_{10} standard reported in Table G-5.1 is based on an annual arithmetic mean, not a geometric mean as reported in the FEIS.

The commentor is correct. Footnote 3 should be deleted from Table G-5.1 of the FEIS (page G-22).

The mean concentrations of chemical constituents reported for the 20th percentile (clear) conditions, should have been reported in nanograms per cubic meter (rather than micrograms per cubic meter). If this conversion is incorrect in the visibility modeling, predicted impacts would be exaggerated.

The values reported in Table G-5.17 of the FEIS (page G-44) were incorrectly labeled "micrograms per cubic meter." The values were actually reported in nanograms per cubic meter; therefore no adjustment of the reported visibility modeling results is necessary.

The FEIS appears to report an incorrect formula to calculate adjusted HAP emissions (page G-B-2 second column, fourth paragraph.

The commentor is correct. A mathematical divisor was missing in the text. The corrected text should read:

Adjusted HAP Emissions (tpy) = (Vasquez-Beggs VOC Emissions) x (HYSYS HAP Emissions (tpy) / HYSYS VOC Emissions (tpy))

However, the calculation was conducted correctly; therefore no adjustment of the reported Adjusted HAP Emissions is necessary.

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Yates Petroleum Corporation objected to including the paragraph on page 49 - Appendix C, Section C-2.0, (dealing with secondary containment of fluids) which is wording derived from language negotiated by operators in their appeal of the Moxa Arch and Fontenelle EISs, into the Jonah II EIS with out additional input from affected operators. It was also noted that the wording is in EPA's proposed SPCC rule modification but that it had not been approved.

Yates Petroleum Companies' objection is noted; however, the wording is being left in the EIS. The requirements outlined in this section apply to all projects in the Rock Springs District, and are consistent with the current regulations, in fact, are seen as clarifying the existing regulations. The wording was developed in coordination with EPA and Petroleum Association of Wyoming. In addition, Yates Petroleum was sent a copy of the revised wording changes on September 24, 1997, and no objection was heard from Yates Petroleum at that time.

A draft Cultural Resource Management Plan is a new term. This plan may be part of the policy developed between BLM and SHPO.

Actually, this is not a new term but plans such as these have rarely been used in southwestern Wyoming. A plan such as this was talked about early on in the EIS process and was again suggested in comments on the DEIS.

Page 43- Section 4.7.5 Mitigation, page 4-50, column 2, paragraph 5 in the DEIS pertains to the abandonment of pipelines. We do not understand the logic or the necessity for adding requirements concerning portable sanitation facilities.

This section deals with other identified mitigation opportunities. The DEIS only identified filling abandoned pipelines with a slurry. Based on comments received on the DEIS, changes to the wording of the identified mitigation measure were made and an additional possible mitigation measure (the need for portable sanitation facilities) was added.

Exception was taken by several Operators to the possible mitigation measure of "The BLM may require mitigation and monitoring measures (e.g., fluid separation, BLM site inspections) that ensure fracturing fluids and condensate are not released into the flare pit and surrounding areas". It was pointed out that WOGCC rules allow these fluids in the reserve pit unless it is in a "critical area" as long as it is not used for long-term storage or disposal. It was also pointed out that it is critical in completing the well that the greatest differential pressure between the producing formation and the surface be obtained. Fluid separation at the surface reduces the differential pressure which could lead to formation damage and decreased hydrocarbon recovery. Secondly, during initial flowback (first 4 to 10 hours), the process

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could generate as much as 1,000 barrels of fluid. Designing a separator to handle these volumes and potential pressures could be quite costly. Thirdly, the pressures and sand which may flow back with the fluid create the potential for corrosion and separator failure resulting in a significant safety concern.

These changes are significant changes that have not been justified by past history of problems or reasonable evidence of any future problems. The additional expense for the mitigation described would be large relative to the perceived environmental benefit. Reviewing the need for these types of mitigation measures on a case-by-case basis would eliminate the potential for impacts without creating a very expensive system that creates additional problems from tanks constantly being exposed to a moist environment and containment or diversionary structures for virtually every piece of equipment.

In the early development of the Jonah field, operators were blowing back the fracturing fluids into the flare pit or over the top of the reserve pit. The high volumes and pressures associated with these wells resulted in fracturing fluids being blown out of the pit and onto the surrounding vegetation. To prevent this from happening, the BLM has been asking operators to blow the flowback into a flat tank until it dries up and can be ignited. Once the flow can be ignited, it can be turned back to the flare pit. The fluids in the frac tank can be separated and the water directed into the reserve pit. BLM is familiar with the concerns regarding expense and jeopardizing the success of the flowback. Blowing into the flat tank is not a great expense and does not cause enough backpressure to jeopardize the success of unloading the well.

Amoco Corporation commented that previous cementing of the production casing from 100 feet above the Lance Formation to total depth was done. Figure 2.2 now depicts that the production string be cemented from 400 feet above the Lance Formation. It is felt that 100 feet of cement above the Lance Formation or above the shallowest gas sands would adequately isolate these hydrocarbon bearing horizons.

The Draft EIS on page 2-11 under the topic "Drilling Operations" (2.4.3) states "Production casing would be run and cement circulated to a minimum of 400 feet above the Lance Formation, effectively isolating all geologic formations and eliminating any fluid migration between hydrocarbon bearing zones and freshwater aquifers." All wells drilled in the Jonah II Project Area have been required to cement production casing 400 feet above the Lance Formation. Figure 2.2 was revised in the FEIS to be in agreement with the stated Proposed Action and this cementing requirement. However, cementing to 400 feet above the top of the Lance may not always be adequate to isolate hydrocarbon bearing zones. Mud logs in some Jonah II Project Area wells have indicated gas bearing sands and coal beds in the Lower Fort Union formation that need to be isolated from fresh

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water zones above them. This is why the production casing sometimes needs to be cemented to 400 feet above the "shallowest gas sands." The "400 feet above" interval instead of the 100 feet allows a safety factor where isolated stray gas sands in the Lower Fort Union may not be cemented over using the smaller interval.

Wyoming Outdoor Council feels the EIS's disclosure of cumulative impacts is woefully inadequate because it 1) fails to take into account existing, proposed and reasonably foreseeable future emissions from other gas projects and other industrial expansions in SW Wyoming: and 2) fails to consider the effects of volatile organic compounds (VOC) to visibility in Wind River Mountain wilderness areas.

This is an issue upon which BLM and WOC disagree. See Section 4.1.18 Incomplete and Unavailable Information on page 39 of the Final EIS for a full response to this comment.

The BLM's failure to design an alternative that comports with the objectives of section 169A of the Clean Air Act and policies of the USDA Forest Service constitutes a gross violation of NEPA.

The FEIS is an analysis and disclosure document, not a decision document, therefore the FEIS only identified what level of impacts would occur at various levels of emissions. Since WDEQ is the primary air quality regulatory agency (with EPA oversight), they are the authorized organization responsible to determine what type and level of air pollutant emission control is necessary.

If the Jonah Field II Proposed Action is approved for development, the project would cause significant visibility degradation in the PSD Class I Bridger Wilderness on 61 days annually, and exceed the USDA Forest Service lake chemistry Limit of Acceptable Change at Klondike Lake and five other lakes sampled during 1997 (and reported to the Wyoming Outdoor Council on March 30, 1998).

Based on "reasonable, but conservative" screening level modeling, as reported in the FEIS (pages 24, 38 and 39), no perceptible potential visibility impacts at the PSD Class I Bridger Wilderness Area were predicted to occur from the Proposed Action or No Action alternatives, and a "just noticeable change" of 1.0 deciview was predicted to be reached or exceeded (maximum 1.6 deciview) on five days annually (four days in January and one day in March) from the Cumulative Sources combined. The FEIS concluded (page 38, paragraph 7), "Given the inherent conservatism in the analysis, it is unlikely (but not impossible) that cumulative air pollutant emissions from throughout southwestern

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Wyoming could cause significant regional haze impacts in the PSD Class I Bridger Wilderness Area."

The maximum predicted atmospheric deposition impacts reported in the FEIS (page 38) at the most sensitive lake location identified by the USDA Forest Service (Saddlebag Lake, in the PSD Class II Popo Agie Wilderness Area) with credible scientific data, were 0.05 kg/ha-yr nitrogen, <0.01 kg/ha-yr sulfur, a 0.002 change in pH, and a 0.5 per cent change in ANC. All of these predicted impacts were considerably less that the USDA Forest Service thresholds for significant change of 3 kg/ha-yr nitrogen, 5 kg/ha-yr sulfur, a 0.1 change in pH, and a 10 per cent change in ANC.

The BLM has discussed the issue of potential impacts from the Jonah Field II project (plus other cumulative emission sources) on more sensitive lakes with the USDA Forest Service since October 1996. The USDA Forest Service expressed their belief that many lakes exist in the Wind River Mountains with ANC values less than 25 microequivalents per liter, where they would consider any additional impacts to be significant. The only data the USDA Forest Service provided BLM supporting their belief was a single 1984 value from Klondike Lake, which the BLM did not adopt as credible scientific evidence. Regardless, the FEIS clearly stated (page 38) "However, if the ANC at Klondike Lake is currently 20 microequivalents per liter, any additional nitrogen deposition would exceed the USFS ANC LAC of "no change."

The new lake chemistry data mentioned by the commentor have not been reviewed by BLM Air Quality Personnel or their peers. Since these data were not provided during the DEIS comment period, BLM will treat the recent disclosure of potentially sensitive lakes as new information as described in the FEIS and in this ROD. The air quality decisions made in this ROD may be confirmed or modified after BLM and peer reviews are completed.

It appears that BLM failed to obtain written comments from the USFWS in violation of Section 102(2)(C) of NEPA and its implementing regulations. Comments from USFWS should have been made available to the public and "accompany[ied] the proposal through the existing agency review process."

The USFWS was involved from the very beginning and played an important role in developing the proposed action, including the development of the Wildlife Monitoring/Protection Plan. Appendix E of the DEIS contained the USFWS's comment letter on the Jonah II Project. On September 10, 1997, the USFWS informed BLM by telephone that the USFWS was happy with the DEIS and would not be submitting written comments.

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It is obvious that operators are violating numerous environmental laws, orders, regulations, and policies with impunity and BLM has failed to properly carry out its inspection and enforcement duties.

Because of the problems cited in comments received on the DEIS, BLM is designating a project manger to coordinate with the Operators to achieve full compliance with terms and conditions of authorizations.

It appears that the Pinedale RA's sole function is now oil and gas permitting. Responsibilities and duties owed to the public that would otherwise be fulfilled and accomplished are going unmet.

Oil and gas permitting is not Pinedale's sole function but it certainly is, and has been, a major workload. BLM has made staffing commitments within our capabilities to manage resources on a multiple use basis which includes permitting oil and gas development (see the response above). Multiple use management is achieved with each and every oil and gas authorization issued. Oil and gas development is authorized in a manner that reduces as far as is practicable the impacts on all the other resources. Also when possible, management for other resources is included in the oil and gas activities such as mowing additional old, decadent sagebrush when installing pipelines. Some oil companies even go beyond what is required and actively pursue wildlife habitat management activities (for example, Mobil Oil doing sagebrush mowing projects near their leaseholds around Calpet).

Cost recovery for permitting authorizations is authorized by law and required by Department policy.

BLM agrees but this issue is beyond the scope of this EIS. When/if a Bureau wide cost recovery program is begun, costs of issuing authorizations will be implemented for this project.

Energy Compliance Corporation asserted incorrectly in their comment on the DEIS that "All of the streams in the Jonah EIS area are Class 4 streams and thus are not navigable waters, therefore, SPCC plans are not required by EPA". The term has received the broadest possible interpretation by the courts. Thus, all surface waters within the Jonah II project area are navigable waters of the United States. Wyoming DEQ's water quality classification has no bearing or whether a surface water would be considered navigable water of the U.S. for this section. Under EPA's rules, SPCC plans are required for facilities "which due to their location, could reasonably be expected to discharge oil in harmful quantities ... into or upon the navigable waters of the United States or adjoining shorelines." 40 CFR 112.1(b).

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The EIS states at page 2-21, column 2, paragraph 4, that each Operator would prepare, as necessary, an SPCCP. The EPA is the agency with the authority to require SPCCPs. This authority was granted to the EPA by 33 USC 1321 and 1361, and Executive Order 12777 (October 18, 1991).

The term *navigable waters* of the United States, as defined by 40 CFR 112.2, also see 112.3(a), means *navigable waters* as defined in Section 502(7) of the Federal Water Pollution Control Act (FWPCA) (33 USC 1362(7) and includes:

(1) all navigable waters of the United States, as defined in judicial decisions prior to passage of the 1972 Amendments to the FWPCA (Public Law 92-500) and tributaries of such waters:
(2) interstate waters; and
(3) intrastate lakes, rivers, and streams which are utilized by interstate travelers from which fish or shellfish are taken and sold in interstate commerce.

The 33 USC 1362(7) defines *navigable waters* as the waters of the United States, including the territorial seas. In *Washington Wilderness Coalition v. Hecla Min. Co.*, 870 F.Supp. 983, 989 (E.D. Wash 1994, the court quoted an earlier interpretation of the definition:

> To the extent permitted under the Constitution, Congress intended "navigable waters" to embrace virtually "every creek, stream, river, or body of water that in any way may affect *interstate commerce*" (emphasis added) quoting *Quivira Min. Co. v. EPA*, 765 F.2d 126, 129 (10th Cir. 1985).

At present, the BLM believes that, according to 40 CFR 112.2, 33 USC 1362(7), and an analysis of the case law, the ephemeral drainage and man-made stock ponds of the Jonah II Project Area may not be navigable waters and may not affect interstate commerce. SPCCPs may be required if the EPA or the state finds that navigable waters occur on the Jonah II Project Area.

The specific requirements of CWA Section 402 should be integrated with BLM's well permitting (APD) process.

The opportunity to do so was identified at the inter-agency meeting held in Cheyenne on March 12, 1998, concerning Exploration Drilling in Sublette County. Ways to integrate the two processes are being pursued.

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McMurry Oil Company feels the FEIS should be changed to clarify that WOGCC has the authority and responsibility to establish and review spacing issues. BLM should maintain the position of 8 surface disturbances per section, and leave the spacing guidance to WOGCC.

> The issue is not that of jurisdiction over spacing. BLM has agreed to follow WOGCC's spacing requirements. The issue is compliance with NEPA. This EIS analyzed 8 wells per section at 80-acre spacing. While some flexibility is permitted, the EIS did not analyze all 8 well locations in a section being all in one corner at a 40-acre or smaller spacing. Spacing at anything less than 80 acres must be analyzed in a new NEPA document before it can be approved.

The USDA Forest Service believes that BLM has both the responsibility and the opportunity to approve the Jonah Project and mitigate potential visibility impacts. This can be done by limiting the number of wells that will be permitted and/or cooperating with the DEQ to limit the level of emission control from gas compression units.

BLM's ROD for the Pinedale RMP states that "Special requirements to alleviate air quality impacts will be included on a case-by-case basis in use authorizations.... Examples of such requirements would include: limiting emissions..." The lease terms BLM currently applies to natural gas development include "Section 6. Conduct of Operations - Lessee shall conduct operations in a manner that minimizes adverse impacts to the land, air, and water.... Lessee shall take reasonable measures deemed necessary by the lessor to accomplish the intent of this section. To the extent consistent with the rights granted , such measures may include, but are not limited to, modification to siting or design of facilities....".

Therefore, based on BLM's own guidance, it would appear appropriate for BLM to require a level of NO_x control for compressor units of 1 g/hp-hr in the ROD. However, if for some reason BLM does not believe it has the legal authority to require such a level of control, the ROD should be contingent upon a commitment from the DEQ to limit NO_x emissions to the 1 g/hp-hr level. We believe that such a commitment from the State DEQ would be adequate means for BLM to demonstrate compliance with its responsibilities.

> We partially agree. BLM has the responsibility to examine potential air quality impacts from the Jonah Field II Project and to either deny, approve, or approve with specific stipulations in order to mitigate environmental impacts. However, the State of Wyoming, with EPA oversight, has the primary responsibility to manage air quality (including AQRVs) within the State of Wyoming. Until recently BLM felt it had independent legal authority to manage all resources on public land. BLM's authority to regulate air quality is limited under Federal law. The Pinedale RMP was signed in 1988, therefore the section quoted is outdated and is no longer accurate regarding the BLM's authority to limit emissions. BLM will continue to cooperate with the USDA Forest Service and WDEQ to limit

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emissions in order to protect AQRVs in southwestern Wyoming. BLM encourages the USDA Forest Service to continue to work with DEQ to resolve AQRV management differences.

Although the ROD would specify that BLM can not authorize any activity which does not comply with all applicable local, state and Federal air quality laws, regulations, standards or implementation plans, issuance of the ROD can not be made contingent upon WDEQ setting a specified level of controls (such as 1 g/hp-hr). WDEQ's authority to set BACT requirements is discretionary, subject to provisions in the State Implementation Plan, as approved by EPA.

BLM used an assumption that the necessary compression for the field will be 12,000 hp. However, in the letter from McMurry Oil Company, they indicate the need for 13,000 hp of compression. It is unclear if BLM plans to limit McMurry to 12,000 hp of compression. If not, the analysis should include the effects of an approximately 8% increase in compression needs and a relative increase in emissions and pollution impacts.

BLM can not authorize compression in the Jonah II EIS area above 12,000 hp without a new environmental analysis that fully discloses the potential impacts of such additional compression.

The FEIS indicated a potential for adverse visibility impairment given assumed NO_x BACT of 2 g/hp-hr for natural gas compressor engines. This potential is significantly reduced if NO_x BACT of 1 g/hp-hr is required. USDA Forest Service discussions with WDEQ indicate 1 g/hp-hr is an appropriate level of control for the type of natural gas compression engines under consideration.

Based on "reasonable, but conservative" screening level modeling, as reported in the FEIS (pages 24, 38 and 39), no perceptible potential visibility impacts at the PSD Class I Bridger Wilderness Area were predicted to occur from the Proposed Action or No Action alternatives, and a "just noticeable change" of 1.0 deciview was predicted to be reached or exceeded (maximum 1.6 deciview) on five days annually (four days in January and one day in March) from the Cumulative Sources combined. The FEIS concluded (page 38, paragraph 7), "Given the inherent conservatism in the analysis, it is unlikely (but not impossible) that cumulative air pollutant emissions from throughout southwestern Wyoming could cause significant regional haze impacts in the PSD Class I Bridger Wilderness Area."

The Proposed Action included 12,000 hp of compression, at a NO_x emission rate of 2 g/hp-hr; a reasonable, but conservative analysis assumption which can be achieved throughout the life of the project. However, the FEIS also examined potential visibility

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impacts under a variety of other emission scenarios. The FEIS also stated (page 29), "the appropriate level of NO_x emission control would be determined and required by the WDEQ during the preconstruction permit process (e.g.; limiting horsepower or NO_x BACT emission levels)."

The DEIS identified 61 days potential visibility impacts in the PSD Class I Bridger Wilderness Area would exceed 0.5 deciview change, but the FEIS revised this number downward to 18 days. It appears that an additional factor was added to the FEIS analysis relative to the probability of transport to Class I area which lowered the estimate. Without a detailed explanation, it is impossible to evaluate the validity of the revised FEIS results.

Both the far-field visibility and atmospheric deposition assessments were revised and reanalyzed between the DEIS and FEIS, including revisions to the emission sources, emission levels, chemical constituents, and correcting the PSD Class I Area boundary receptor locations. The technical basis for the analysis was presented in detail in the FEIS (pages G-36 through G-45).

Based on the instantaneous straight-line Gaussian screening model, visibility impacts were predicted at the PSD Class Area boundary under all meteorologic conditions, even where travel time and varying winds would preclude such transport. A separate "puff" analysis was also performed (BLM 1996b), identifying those conditions where cumulative emission sources would not reach the PSD Class I area boundary. Although potential visibility impacts were calculated for every day and reported in the FEIS (pages G-G-1 through G-G-12), the impact summaries of both the DEIS and the FEIS excluded days where pollutants would not reach the PSD Class I area boundary. None of these excluded days predicted perceptible visibility impacts.

The FEIS indicates potential VOC emissions were not considered by BLM in their visibility analysis. The FEIS should be clarified to indicate the BLM actually assumed that VOC have no impact on visibility.

The FEIS very clearly states (page 41, paragraph 2) "At present, organic aerosol formation processes are not well understood, and modeling techniques are not available for estimating visibility degradation due to secondary organic aerosols." and "Finally, estimation of potential visibility impacts due to secondary organic aerosol formation is not supported by credible scientific evidence; therefore, it was not included in the Jonah Field II air quality impact assessment."

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The BLM visibility impact analysis did not compare potential impacts to the 90th percentile visibility conditions as requested by the USDA Forest Service. In addition, the year of background visibility conditions measured at Fremont Lake (1995) was not a very clean year, and may have significantly underestimated the number of days the USDA Forest Service visibility Limit of Acceptable Change (0.5 deciview) would be exceeded. Without an analysis of a more representative year, BLM should not claim "the modeling results clearly overestimate the impacts that are likely to occur from the Jonah Field II Proposed Action or alternatives."

The USDA Forest Service preferred method of comparing every day in a year to the 90th percentile (very clean condition) is not scientifically credible, since this 90th percentile value would typically be reached or exceeded only 10 per cent of the time. As discussed in numerous "Stakeholder" group meetings, BLM identified 1995 background visibility data to be representative of existing conditions (Affected Environment), and calculated potential daily visibility impacts above existing conditions from the Proposed Action and alternatives, including the No Action alternative, and cumulative emission sources not included in background. Finally, the FEIS also described (pages 34 through 37) many other reasonable, but conservative assumptions which overestimate the predicted air quality impacts, plus five assumptions which potentially underestimate potential impacts.

The BLM should specifically identify what improvements in the emissions inventory and impact analysis procedures were made which caused predicted air quality impacts to be so much lower in the Jonah Field II FEIS than what was reported in the Moxa/Fontenelle analysis. While the amount of gas burned per well could be so different as to not be comparable, the emission factors (AP-42) should not change significantly.

As stated in the FEIS (pages 77-55 and 77-56, comment response 21), "The Bureau conducts each air quality impact assessment based on the 'credible scientific evidence' available at the time of the analysis. Several improvements in both the southwestern Wyoming air pollutant emissions inventory and the potential impact analysis procedures were made in the Jonah Field II assessment. Comparisons to the results of other previous NEPA analyses (i.e.; Moxa Arch, Fontenelle, Cave Gulch, etc.) are simply not valid." For example, the Jonah Field II analysis improved the emission source inventory and corrected the PSD Class I Area boundary receptor locations. However, all information necessary for the reviewer or the decision maker to evaluate the technical adequacy of air quality impact assessment (including emission factors) was included in the FEIS.

The Jonah Field II air quality impact assessment continues to assume a shorter time period for construction (44 days) than reported in the FEIS (49 days).

As stated in the FEIS (page 7-56, comment response 25), "The air quality impact assessment assumed the five day 'construction' and five day 'pipeline and ancillary facility

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installation' would occur concurrently during the total 44 day well 'construction/drilling/testing' time period."

The USDA Forest Service Synoptic lake chemistry survey of the Wind River Mountains identified another five lakes (out of 50 sampled) with ANC measured at less than 25 microequivalents per liter, where USDA Forest Service Limit of Acceptable Change is "no change," and the maximum allowable loss of ANC would most likely be exceeded.

The BLM has discussed the issue of potential impacts from the Jonah Field II project (plus other cumulative emission sources) on more sensitive lakes with the USDA Forest Service since October 1996. The USDA Forest Service expressed their belief that many lakes exist in the Wind River Mountains with ANC values less than 25 microequivalents per liter, where they would consider any additional impacts to be significant. The only data the USDA Forest Service provided BLM supporting their belief was a single 1984 value from Klondike Lake, which the BLM did not adopt as credible scientific evidence.

Only now, in a letter to the BLM after the FEIS was published, has the USDA Forest Service indicated they have additional data from more sensitive lakes. These new lake chemistry data have not been reviewed by BLM Air Quality Personnel or their peers. Since these data were not provided during the DEIS comment period, BLM will treat the recent disclosure of potentially sensitive lakes as new information as described in the FEIS and in this ROD. The air quality decisions made in this ROD may be confirmed or modified after BLM and peer reviews are completed.

In addition, the FEIS clearly stated (page 38) "However, if the ANC at Klondike Lake is currently 20 microequivalents per liter, any additional nitrogen deposition would exceed the USFS ANC LAC of "no change."

It is not appropriate to assume that all wells permitted in 1995 were operational and reflected in the background visibility monitoring data. In addition, since the ROD is likely to be issued in March or April 1998, the cumulative impacts assessment should have included potential air quality impacts from sources that would be operational at that time.

The FEIS clearly describes why wells permitted before January 1996 were not specifically modeled in the cumulative air quality impact analysis (page 40, paragraph 3). All reasonably foreseeable emission sources were included in the air quality impact assessment, including many which will not become operational until 15 (or more) years after the ROD is issued.

BLM states that the ISCST3 model overestimates transport for travel distances over thirty miles indicating that this adds to the conservatism of the air quality analysis. However, the PSD

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Class I Bridger Wilderness Area boundary is approximately twenty miles from the Jonah Field II project area, and is "near-field" with respect to modeling.

BLM concurs; ISCST3 model results will overestimate impacts less at receptors closer to the assumed emission sources. However, the cumulative impact study area shown in the FEIS (page G-14, Figure G-2.2) was approximately 270 km (168 miles) by 340 km (211 miles).

BLM also states that complex terrain in the Green River Basin would influence air pollution plume transport, and that it is unlikely that pollutants would be transported over 4000 feet in elevation to reach the sensitive receptors. However, the elevation difference between the Jonah Field II project area and the PSD Class I Bridger Wilderness Area boundary is only 500 and 900 feet.

The ISCST3 screening model assumed the analysis region was as flat as a table top and plume transport would occur in an instantaneous straight line. Any intervening terrain would affect this assumed plume transport. In addition, even if the terrain between the project area and the Wilderness Area boundary is relatively level, the massive Wind River Mountain Range will affect transport winds, due to drainage winds and the synoptic disturbance, which can not be included into the screening analysis. Finally, although the visibility impact analysis was calculated at the Wilderness Area boundary, the atmospheric deposition analysis was calculated at the high mountain sensitive lake receptors.

The atmospheric deposition analysis uses actual lake chemistry which inherently includes the natural buffering contributed by the surrounding watershed and calculates how much deposition would fall into the lake itself. In reality, the increased deposition from the entire watershed that ends up in lake would compound the effects laid out in the FEIS. Unless increased deposition of basic compounds from the proposal would offset increases in acidic deposition (there is no evidence to support this), no additional buffering from the watershed would occur over what is currently reflected in the lake chemistry. In addition, turnover rates of 2.7 years in Deep Lake do reflect the inflow and outflow from the lake, as does the lake chemistry used in modeling. This lake chemistry (against which the additional acidic inputs were measured) incorporates the dynamic flow of chemical compounds, both basic and acidic, which occur in nature.

As stated in the FEIS (page 35, paragraphs 6 and 7), "The atmospheric deposition impact analysis assumed no other ecosystem components would affect lake chemistry for a full year (assuming no chemical buffering due to interaction with vegetation or soil materials)" and "The atmospheric deposition impact analysis also assumed only precipitation water would enter Deep Lake for an entire 2.7 years (assuming the natural watershed would behave like a water sample in a laboratory beaker, without stream-water entering or leaving the Lake for nearly three years)."

The background lake chemistry data used in the atmospheric deposition analysis were based on the most sensitive conditions measured with scientifically credible results. Although these background conditions reflect whatever natural chemicals enter the lake system, the impact assessment assumed a full year (and nearly three years for Deep Lake) of potential depositional impacts occurred at once, "like a water sample in a beaker." These assumptions are reasonable, but conservative, because it is unlikely the only chemical constituents in the lakes come from the atmosphere, without geologic and biologic factors.

The USDA Forest Service can not concur that the Continental Divide and Ultra natural gas development projects are too speculative to be included in the Jonah Field II FEIS.

As the BLM has stated numerous times in air quality impact assessment "Stakeholder" group meetings, and in the FEIS (pages 39 and 40), the Continental Divide and Ultra project proposals were specifically not included in the Jonah Field II analysis as reasonably foreseeable developments because of their preliminary, unsettled, and speculative status. In the future, as NEPA analyses are developed for these projects, cumulative air quality impact assessments including other reasonably foreseeable emission sources (such as those analyzed in the Jonah Field II FEIS) will be conducted.

Why are non-BACT emissions listed in Table G-2.2 lower than the BACT emissions?

As described in the FEIS (section G-2.2), "non-BACT" emissions are based on a total well VOC emission rate of 20 tpy, for which BACT is not normally required. However, the "BACT" emissions are based on a total uncontrolled well VOC emission rate of 233 tpy, for which flaring is the assumed control technology (increasing NO_x emissions), and the total controlled "BACT" well VOC emission rate becomes nearly 25 tpy.

It appears that increased emissions from the General Chemical, SF Phosphates Ltd. Company, and Sinclair Oil Refinery were not included in the cumulative air quality impact assessment. BLM should coordinate with WDEQ and include any emission changes where WDEQ has indicated an intention to issue a permit for the modifications.

BLM has worked very closely with WDEQ to ensure the emissions assumed in the air quality impact assessment reflect reasonably foreseeable development. However, WDEQ has discretionary authority regarding permit review and their decision making process. BLM determined that the General Chemical, SF Phosphates Ltd. Company, and Sinclair Oil Refinery were not reasonably foreseeable at the time of the analysis. These, and other future proposed sources, will be re-evaluated for inclusion in future BLM NEPA air quality impact assessments.

Wyoming Audubon wrote that since golden eagles are the most frequent predators of adult sage grouse, it is very important to remove from the area near a lek any high-profile structures on which eagles can perch. A quarter-mile is insufficient; a half-mile would be more appropriate.

Only in the last few years has BLM been requiring the quarter mile buffer around leks. There is no documented evidence that this buffer is not sufficient and that a larger buffer is needed. However, each case is dealt with individually and larger buffers can be achieved where a larger buffer is needed.

Wyoming Game and Fish Department asked how current and future air quality standards and associated changes due to gas development will affect habitat management through prescribed burning. WGFD also noted that additional impacts from oil/gas development not only affect their staff time associated with identifying and mitigating impacts, but may affect their ability to develop cost-effective solutions to resolve some of those impacts.

It is currently unknown how the USDA Forest Service's Limit of Acceptable Change or WDEQ's management of the air quality related values will affect prescribed burning. The WGFD is correct in their observation that the ability to conduct prescribed burns may be hampered.